

# Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 40 Use 1	Soil Origin: TU-108A ESU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 02/04/2020

Systematic Soil Sample Data: RSY 40 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU108A-001	1	Systematic	11,425	15,359	0.484	-0.0669	0.0219
HPPG-ESU-TU108A-002	2	Systematic	10,591	15,359	0.309	-0.0201	N/A
HPPG-ESU-TU108A-003	3	Systematic	11,020	15,359	0.511	0.0328	N/A
HPPG-ESU-TU108A-004	4	Systematic	11,152	15,359	0.267	-0.0346	N/A
HPPG-ESU-TU108A-005	5	Systematic	10,665	15,359	0.124	-0.0114	N/A
HPPG-ESU-TU108A-006	6	Systematic	10,231	15,359	0.505	-0.0255	N/A
HPPG-ESU-TU108A-007	7	Systematic	10,919	15,359	0.331	0.0105	N/A
HPPG-ESU-TU108A-008	8	Systematic	10,719	15,359	0.497	-0.00348	N/A
HPPG-ESU-TU108A-009	9	Systematic	10,601	15,359	0.484	0.0264	N/A
HPPG-ESU-TU108A-010	10	Systematic	10,868	15,359	0.362	0.00617	N/A
HPPG-ESU-TU108A-011	11	Systematic	9,584	15,359	0.366	0.0292	0.0638
HPPG-ESU-TU108A-012	12	Systematic	9,850	15,359	0.263	-0.0612	N/A
HPPG-ESU-TU108A-013	13	Systematic	10,167	15,359	0.420	-0.000953	N/A
HPPG-ESU-TU108A-014	14	Systematic	10,331	15,359	0.397	0.00224	N/A
HPPG-ESU-TU108A-015	15	Systematic	10,283	15,359	0.0697	-0.00700	N/A
HPPG-ESU-TU108A-016	16	Systematic	10,994	15,359	0.418	-0.0319	N/A
HPPG-ESU-TU108A-017	17	Systematic	9,587	15,359	0.253	0.000307	N/A
HPPG-ESU-TU108A-018	18	Systematic	9,733	15,359	0.0360	0.00217	N/A
HPPG-ESU-TU108A-019	19	Systematic	10,501	15,359	0.475	-0.0469	N/A
HPPG-ESU-TU108A-020	20	Systematic	10,079	15,359	0.248	-0.00489	N/A
HPPG-ESU-TU108A-021	21	Systematic	10,749	15,359	0.463	0.0212	-0.120
HPPG-ESU-TU108A-022	22	Systematic	9,585	15,359	0.386	-0.0248	N/A
HPPG-ESU-TU108A-023	23	Systematic	10,385	15,359	0.353	0.0263	N/A
HPPG-ESU-TU108A-024	24	Systematic	10,092	15,359	0.418	-0.00127	N/A
HPPG-ESU-TU108A-025	25	Systematic	10,485	15,359	0.326	-0.0454	N/A
<b>Soil Systematic Sample Statistics</b>					<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Maximum					0.511	0.0328	0.0638
Mean					0.3507	-0.0092	-0.0114
Median					0.366	-0.0035	0.0219
Minimum					0.036	-0.0669	-0.120
Standard Deviation					0.1321	0.0277	N/A

Biased Soil Sample Data: RSY 40 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU108A-B-001	1	Biased	11,090	15,359	0.579	0.0216	0.0789

CPM Counts per minute  
pCi/g Picocuries per gram

\* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-11072020-PG-ROV-287	11/07/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-11092020-PG-JSS-291	11/09/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-11092020-PG-JSS-289	11/09/2020	3x3	10/09/2021	271420
Biased Sample Survey	HPRS-11092020-PG-JSS-290	11/09/2020	3x3	10/09/2021	271420

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 40 Use 1
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 42 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 42 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-55.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 56-90). Ten percent of the systematic soil samples (three samples in total -001, -011, &amp; -021) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 56-90). Samples HPPG-F-031 and HPPG-F-032 are field duplicates, correlating to systematic samples -001 and -010. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1, one biased sample was collected from the location of the highest gross gamma scan measurement, since all follow-up static measurements were below the ROC-specific critical levels. TestAmerica sample results are attached (pages 91-106). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p><b>Conclusions:</b></p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 40 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-108A ESU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-108.</p>

## Soil Scan Statistics

### Statistical Summary

Dataset	PG-RSY-40-U1				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	27.06	13.72	13.53	3.75
ROI-06	54.11	134.31	94.41	94.22	12.02
ROI-07	37.09	113.24	73.36	73.18	10.10
ROI-08	72.15	164.35	118.11	118.26	13.47
ROI-10	1,667.53	2,704.99	2,334.60	2,347.20	150.12

### Statistical Summary Reference Background

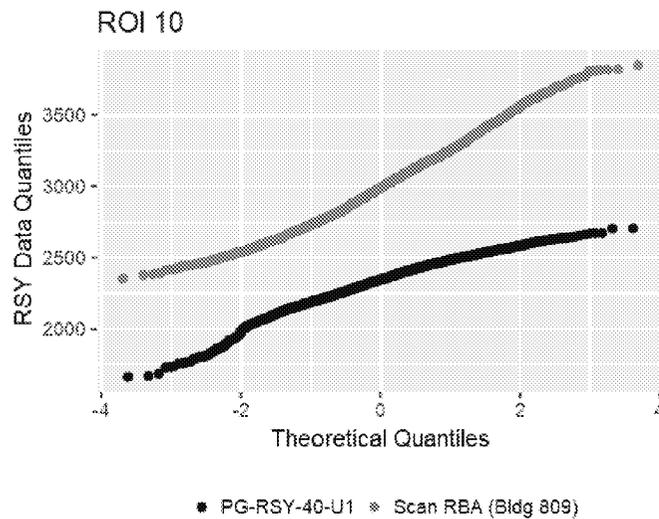
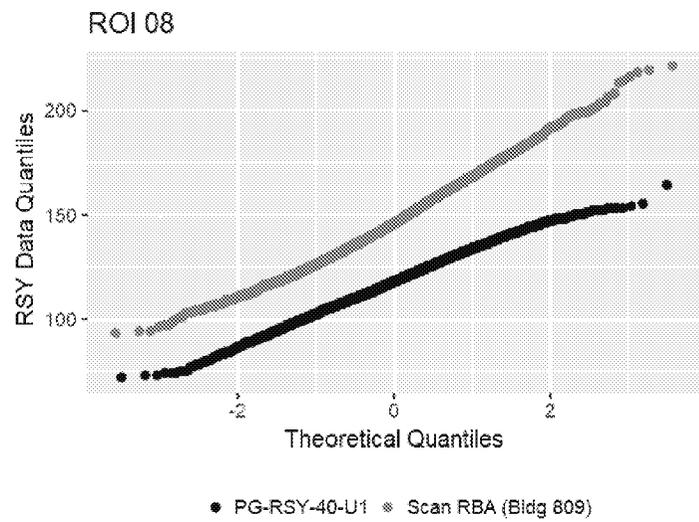
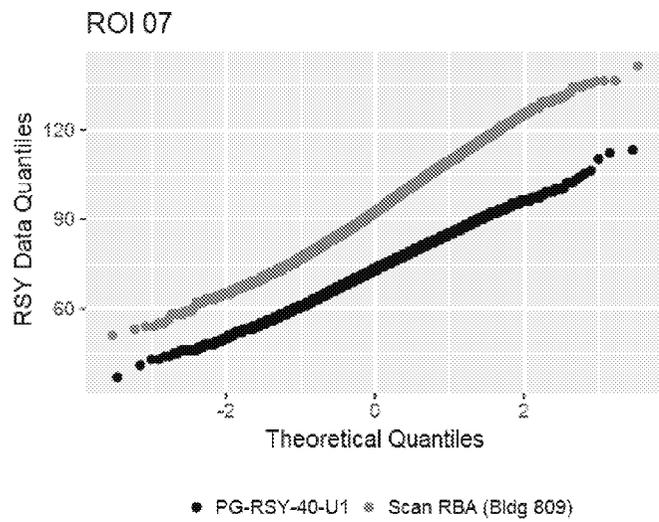
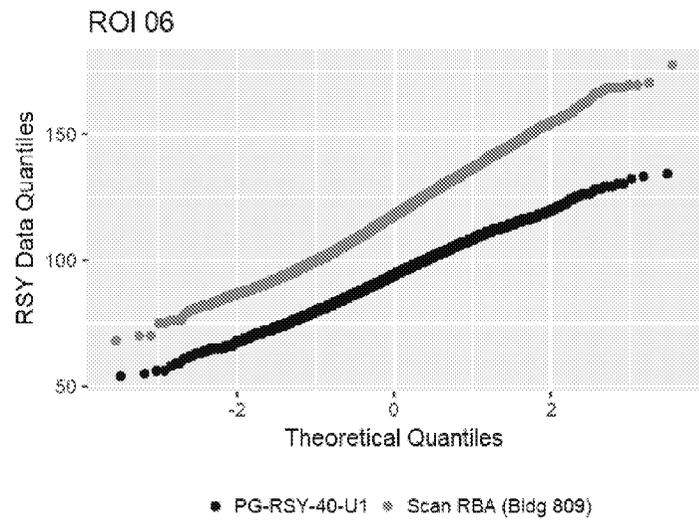
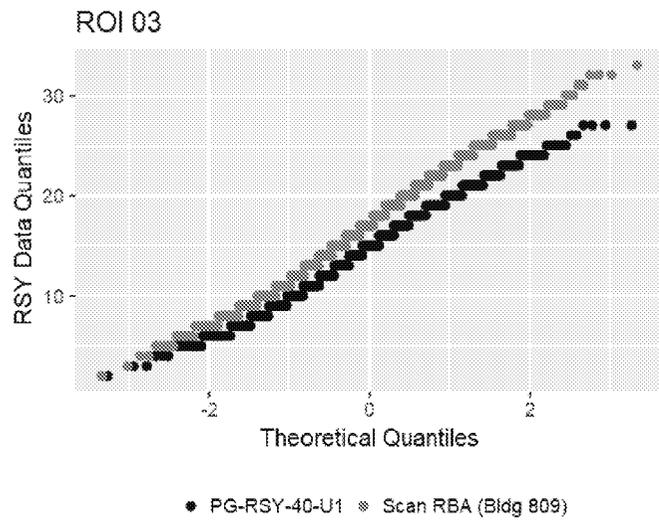
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-40-U1	3456
Scan RBA (Bldg 809)	4632

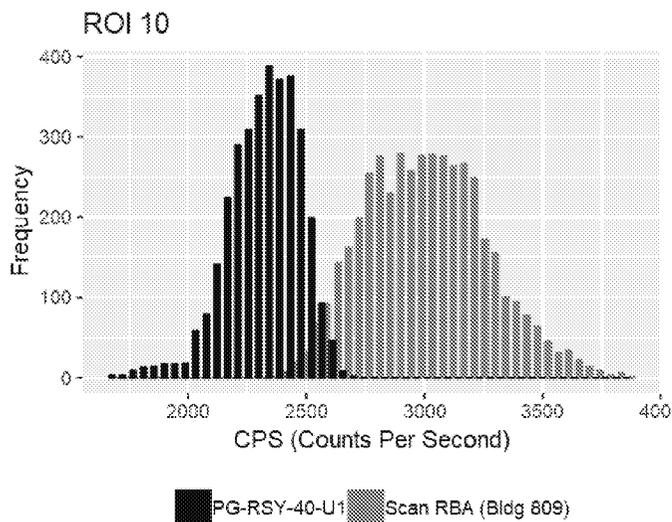
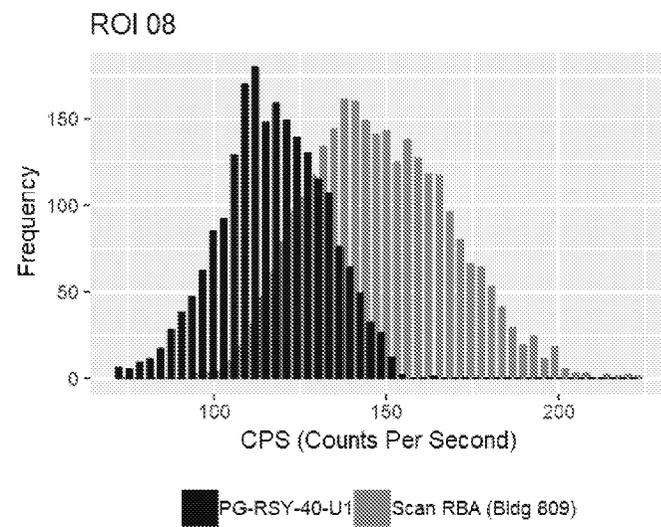
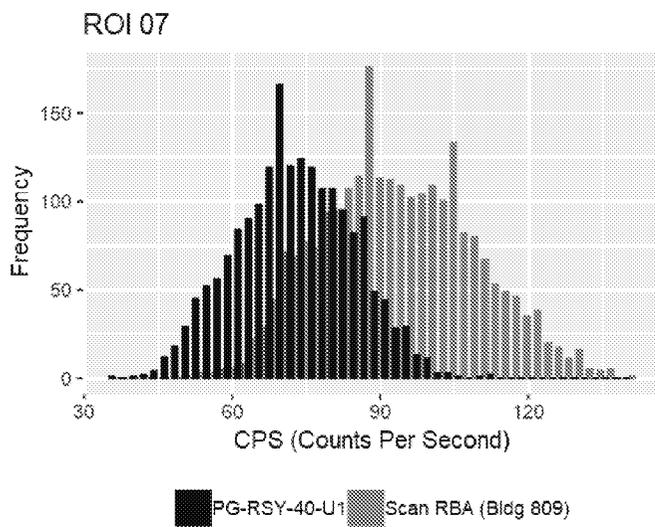
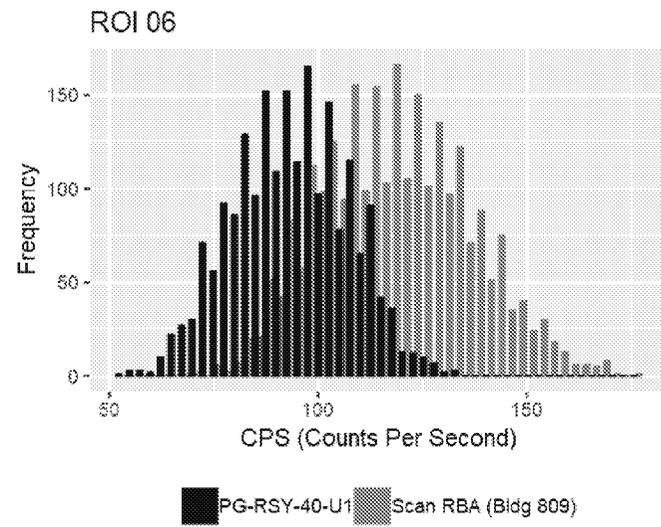
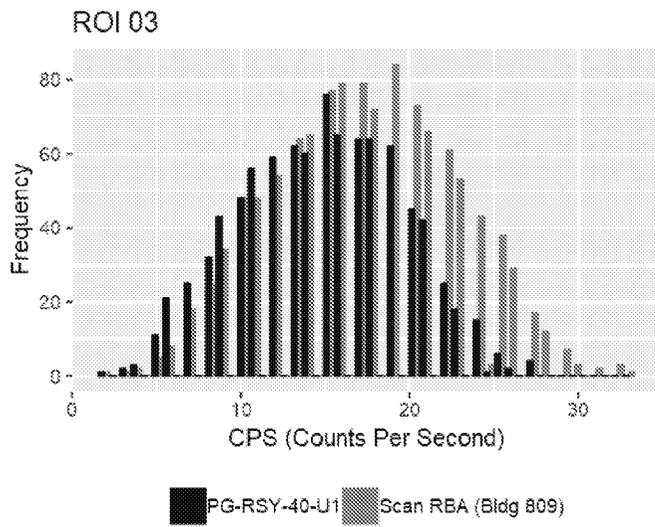
# Soil Scan Statistics

## Normal Q-Q Plots



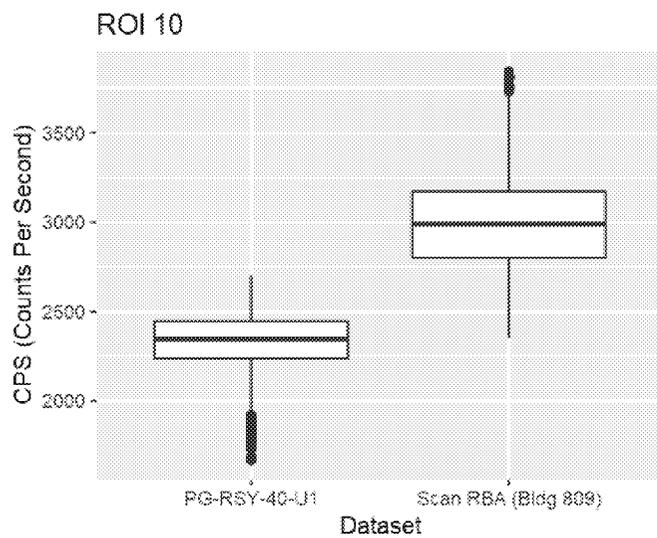
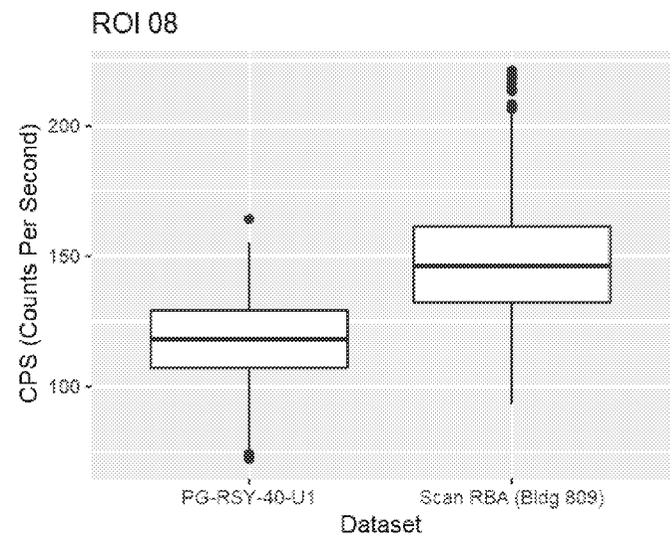
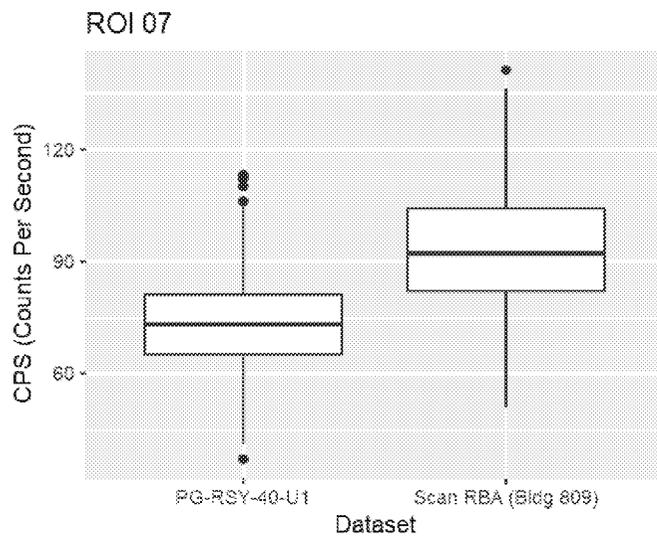
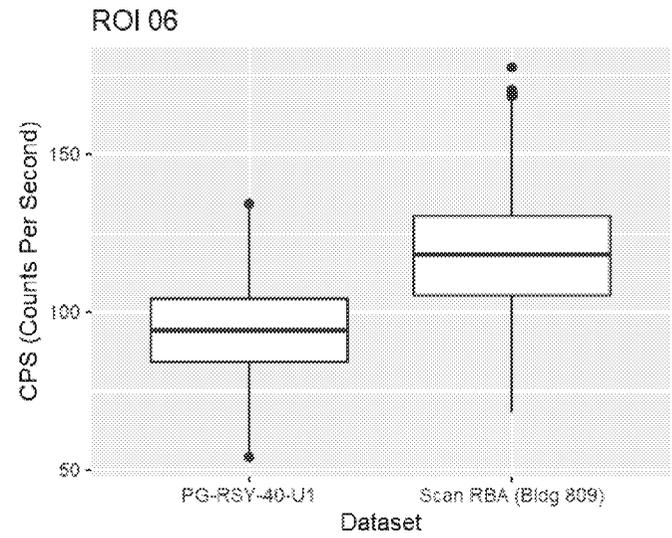
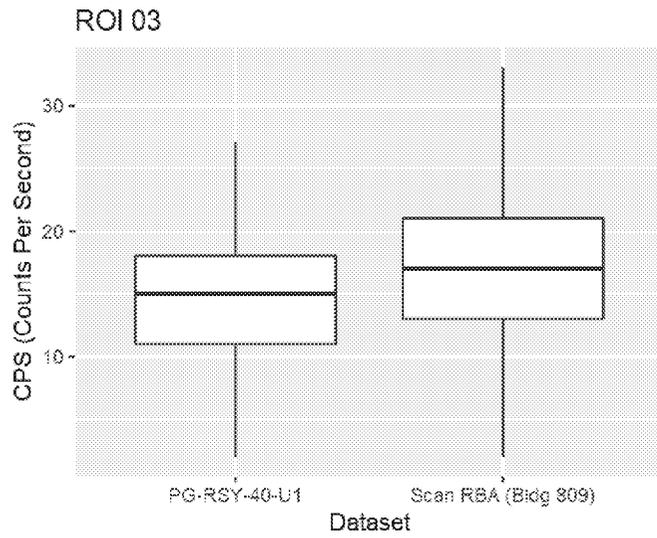
# Soil Scan Statistics

## Histograms



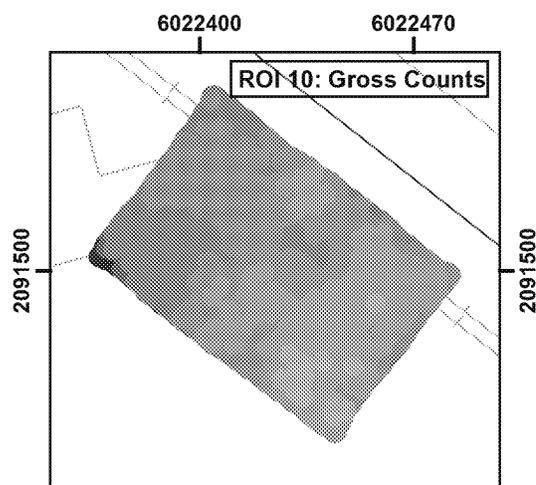
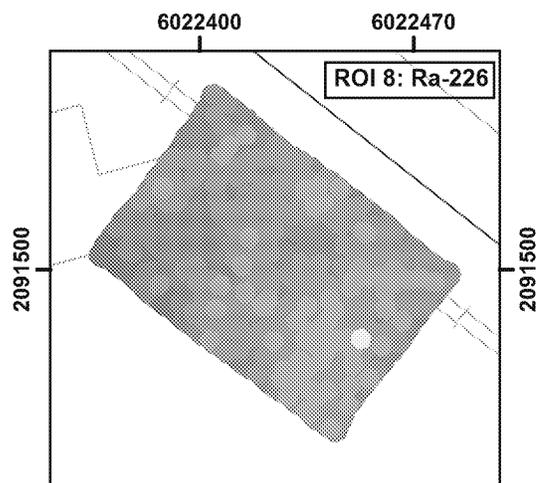
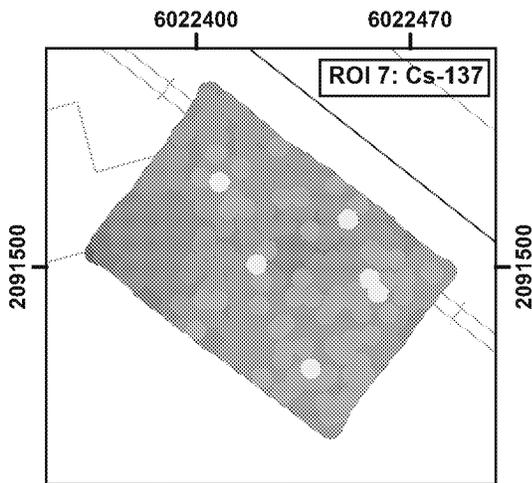
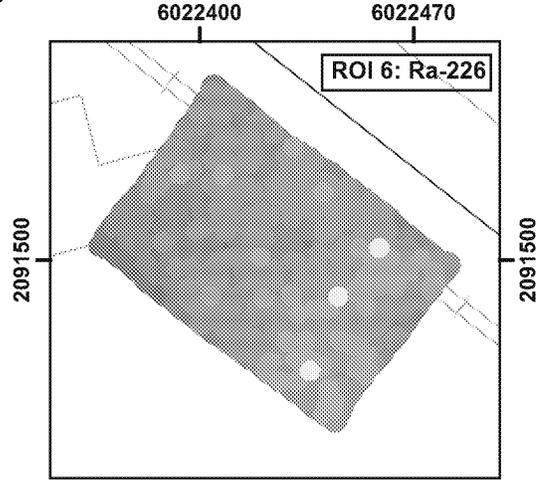
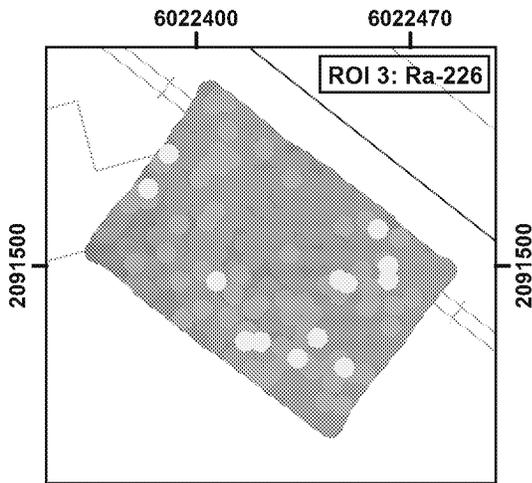
# Soil Scan Statistics

## Box Plots



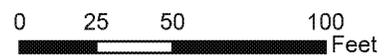
RSI Data Plots  
HPNS Parcel G  
RSY 40 Use 1

TU-108A ESU



RS 700 Gamma Walkover Survey Data (VD1)

- > 3 std dev      ● > -1 to < 0 std dev
- > 2 to < 3 std dev      ● > -2 to < -1 std dev
- > 1 to < 2 std dev      ● > -3 to < -2 std dev
- > 0 to < 1 std dev      ● < -3 std dev

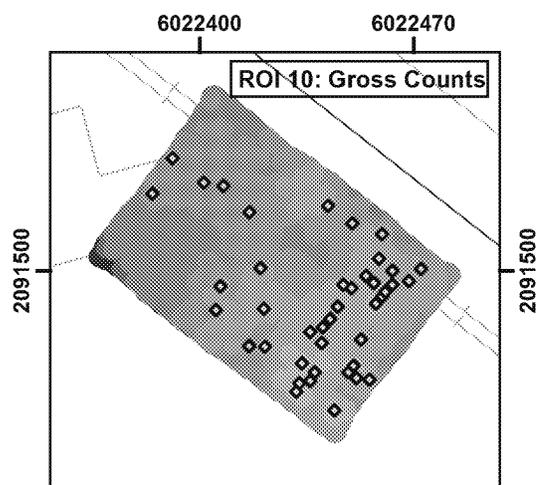
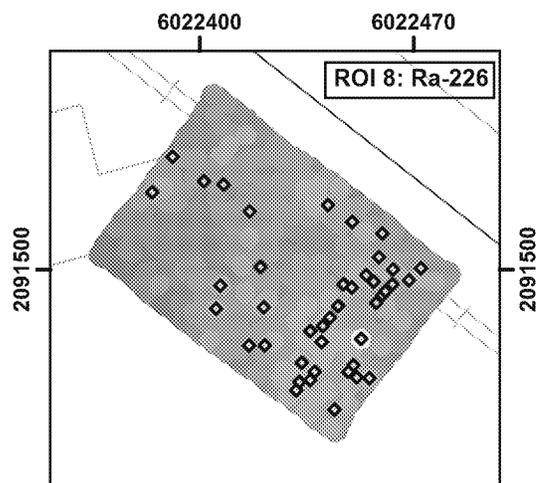
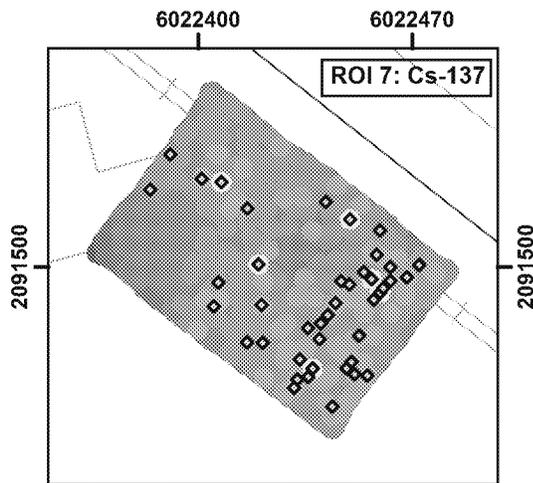
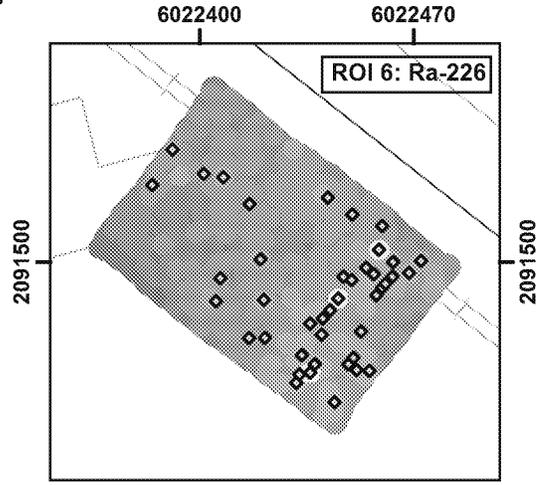
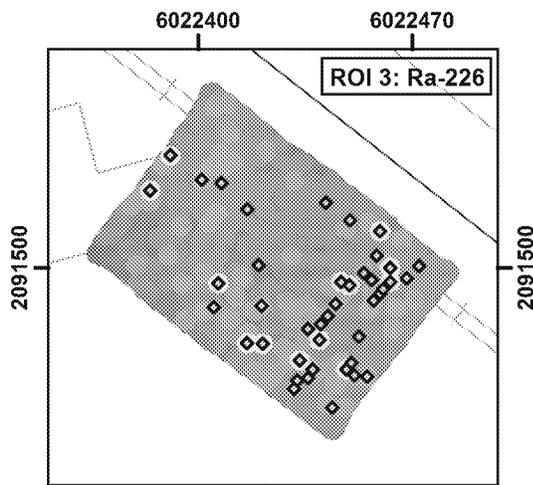


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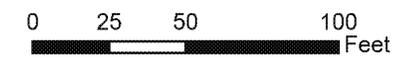
RSI Data Plots  
HPNS Parcel G  
RSY 40 Use 1

TU-108A ESU

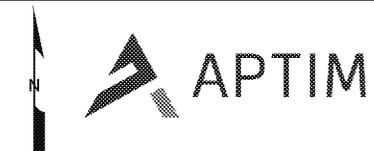


**RS 700 Gamma Walkover Survey Data (VD1)**

◆ Follow-Up Location	● > -1 to < 0 std dev
● > 3 std dev	● > -2 to < -1 std dev
● > 2 to < 3 std dev	● > -3 to < -2 std dev
● > 1 to < 2 std dev	● < -3 std dev
● > 0 to < 1 std dev	



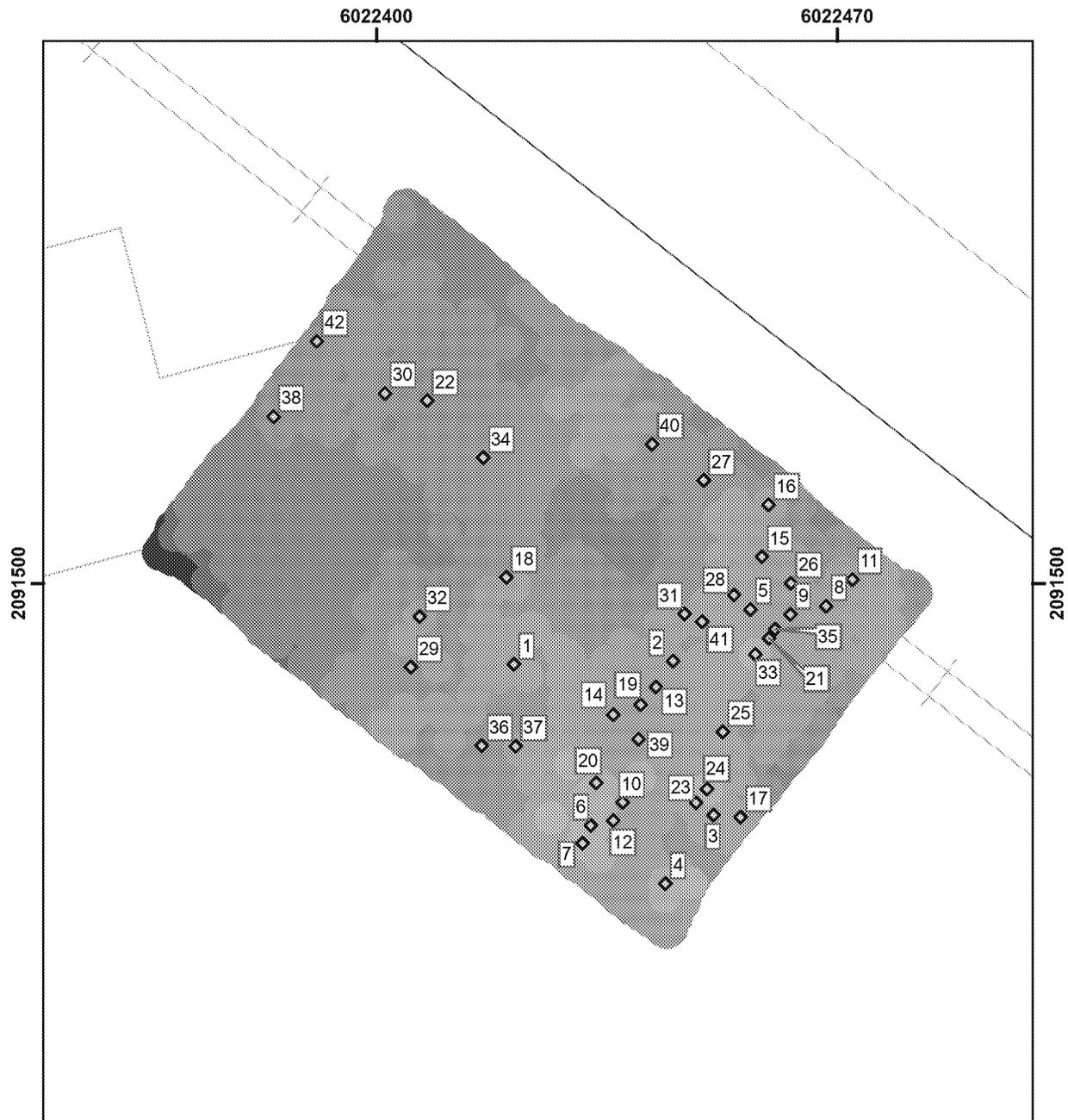
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Follow-Up Static Survey  
HPNS Parcel G RSY 40  
Use 1

TU-108A ESU



**RSY 40 Use 1 (VD1, ROI 10 Gross Gamma)**

◆ Follow-Up Locations	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

0 10 20 40  
Feet

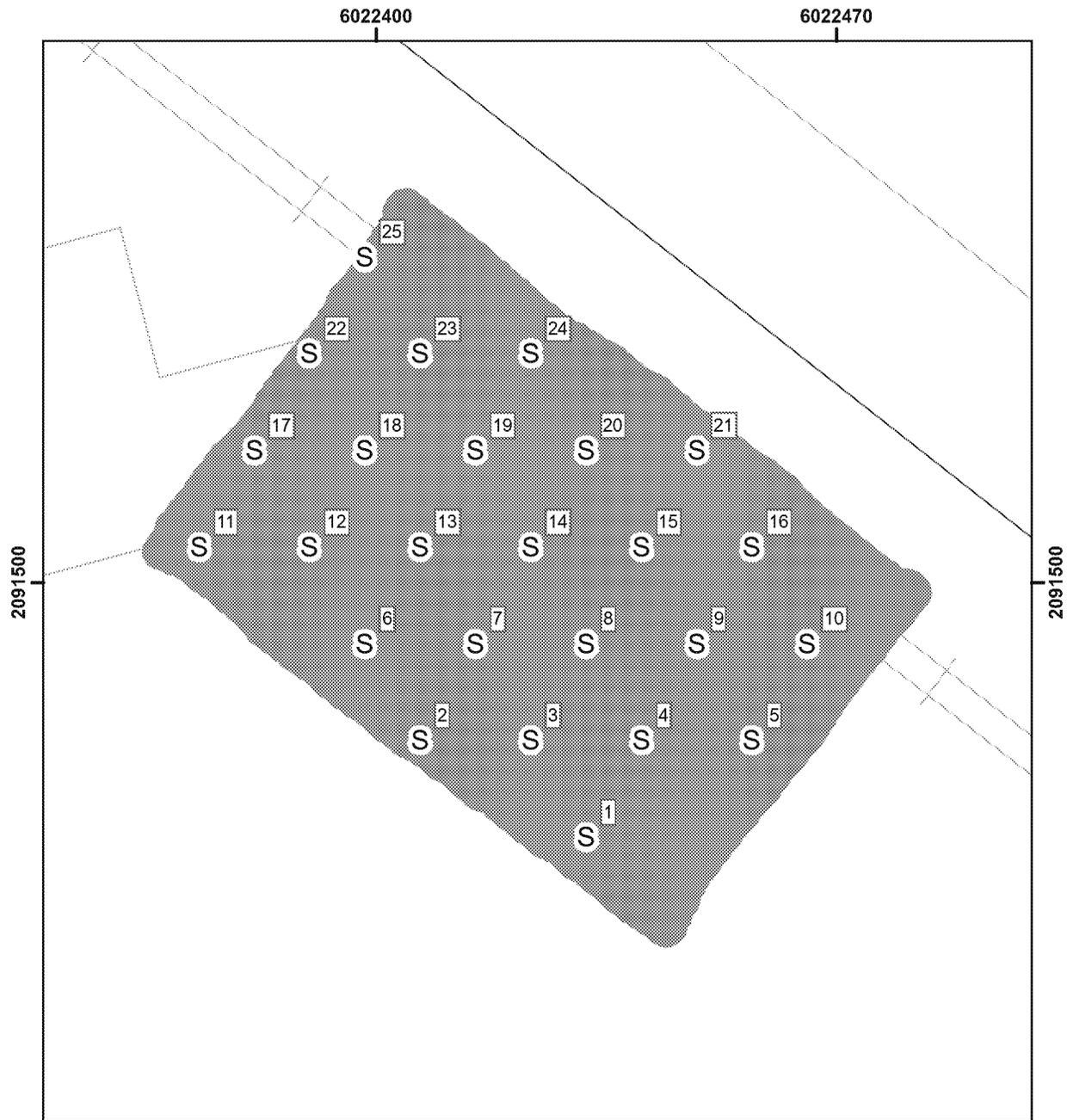
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The logo for APTIM, featuring a stylized 'A' symbol followed by the word 'APTIM' in a bold, sans-serif font.

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Systematic Sampling  
HPNS Parcel G  
RSY 40 Use 1

TU-108A ESU



**RSY 40 Use 1**

- S Systematic Sample Locations
- RS-700 GWS Coverage

0 10 20 40 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

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Biased Sampling  
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RSY 40 Use 1

TU-108A ESU



**RSY 40 Use 1**

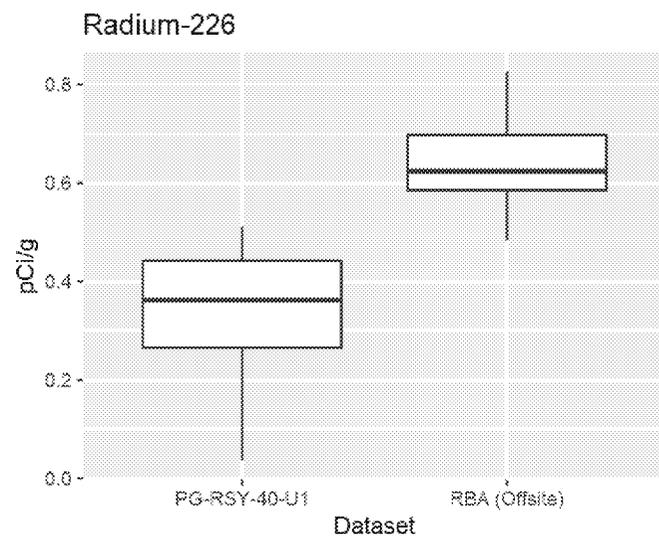
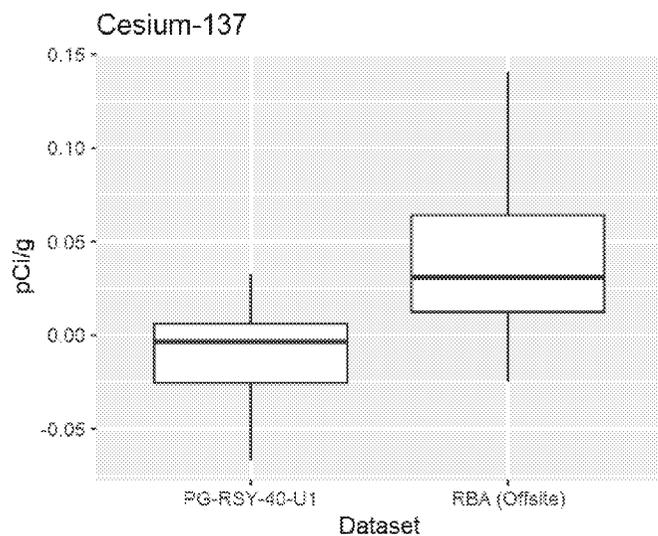
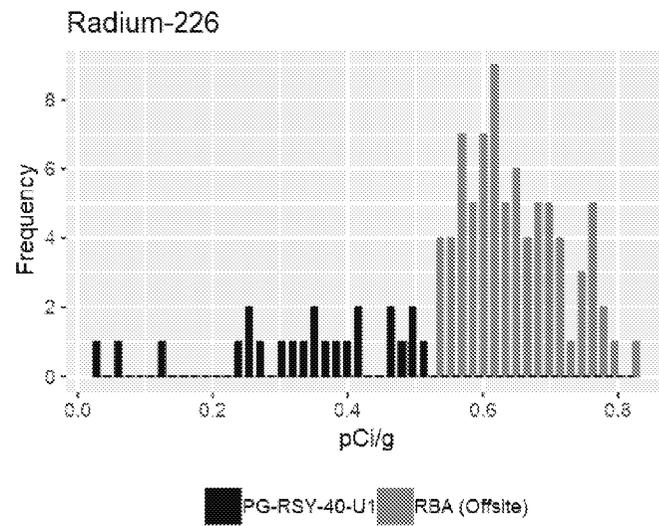
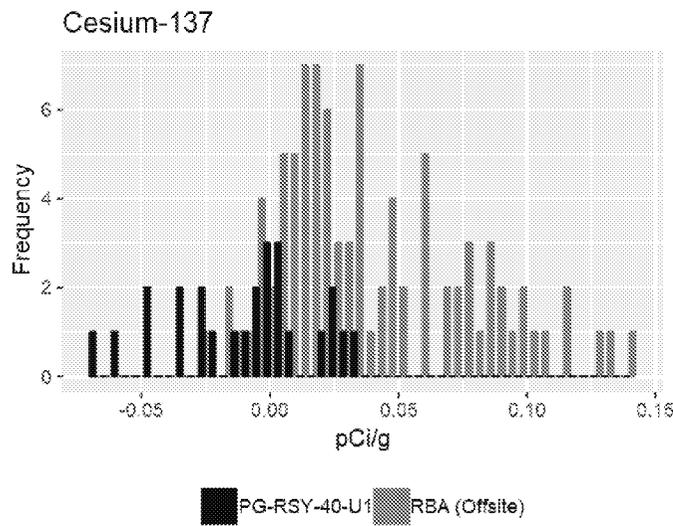
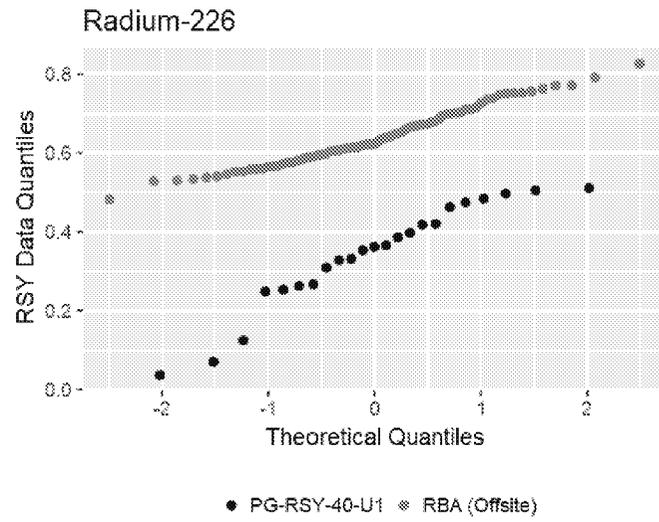
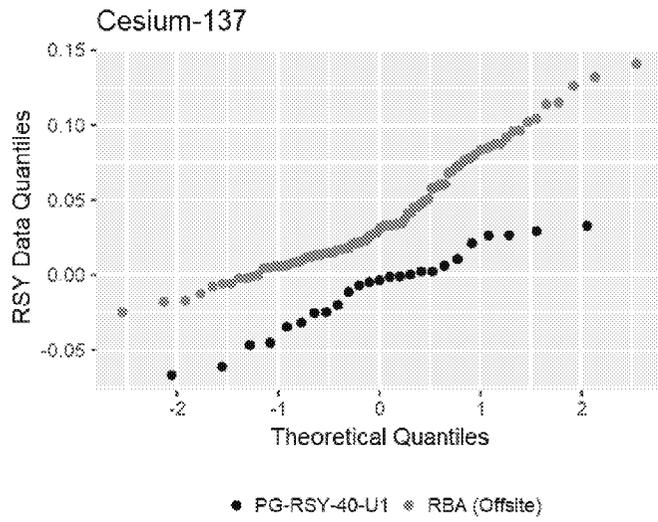
- B** Biased Sample Location
-  RS-700 GWS Coverage

25 12.5 0 25 Feet

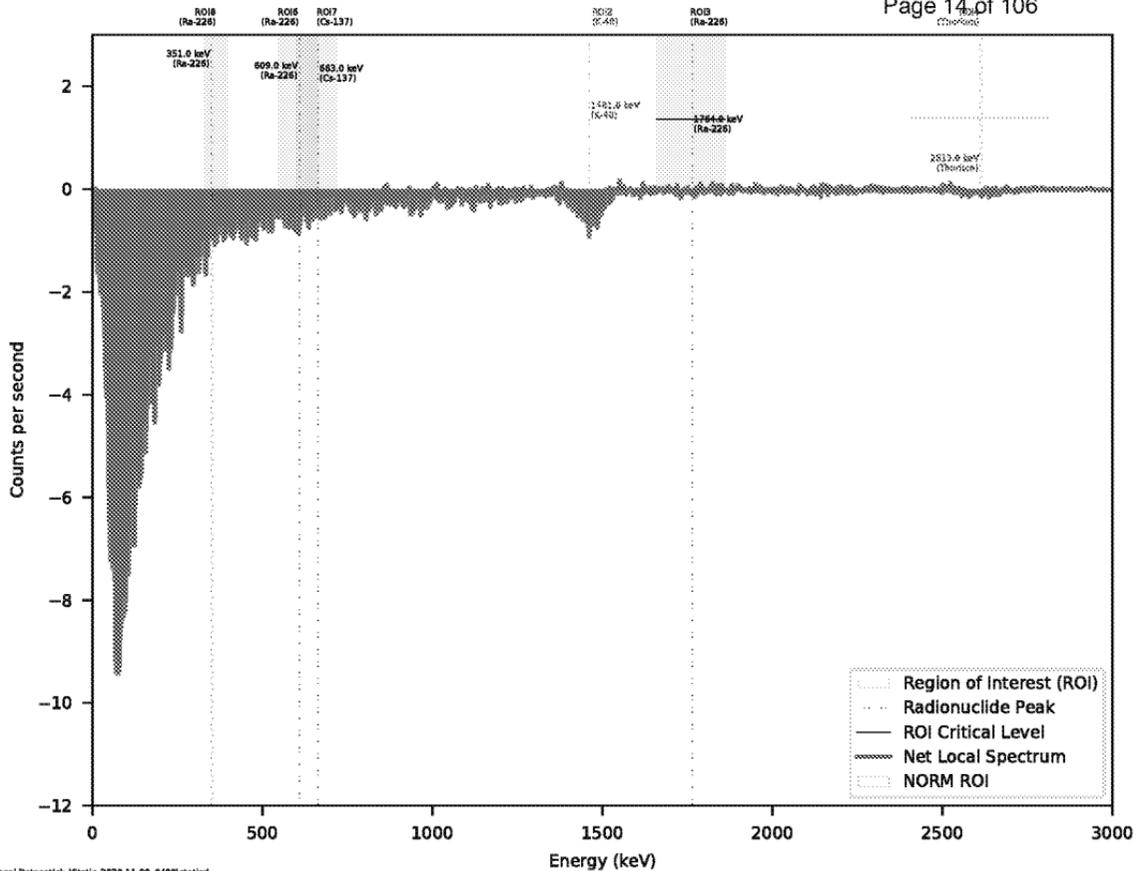
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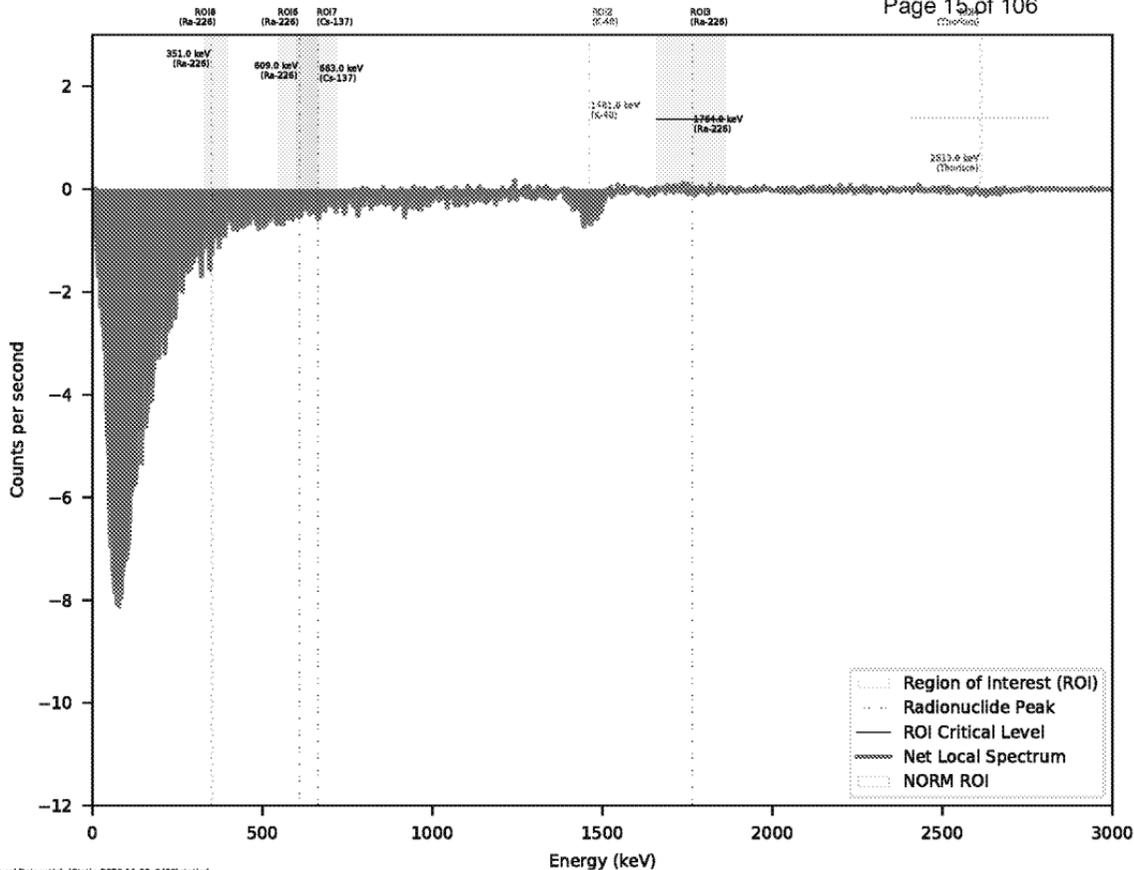


# Soil Sample Statistics

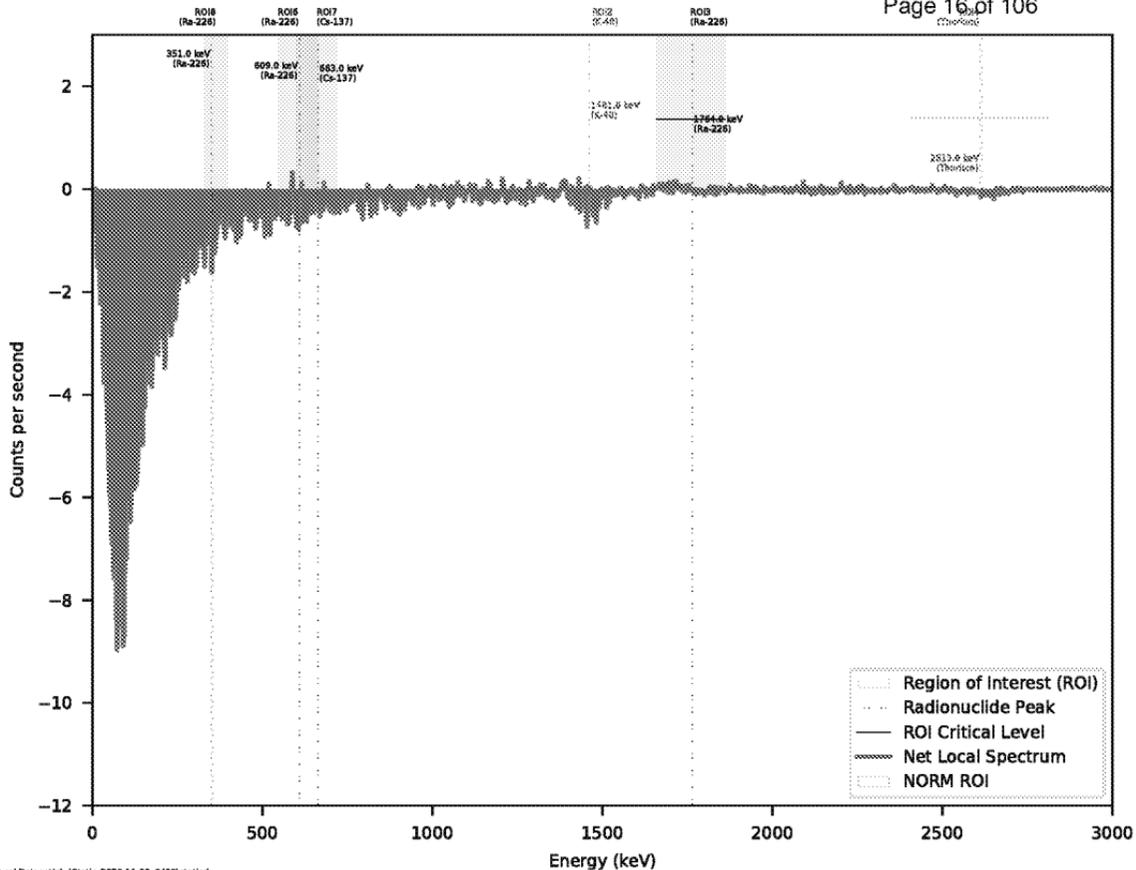


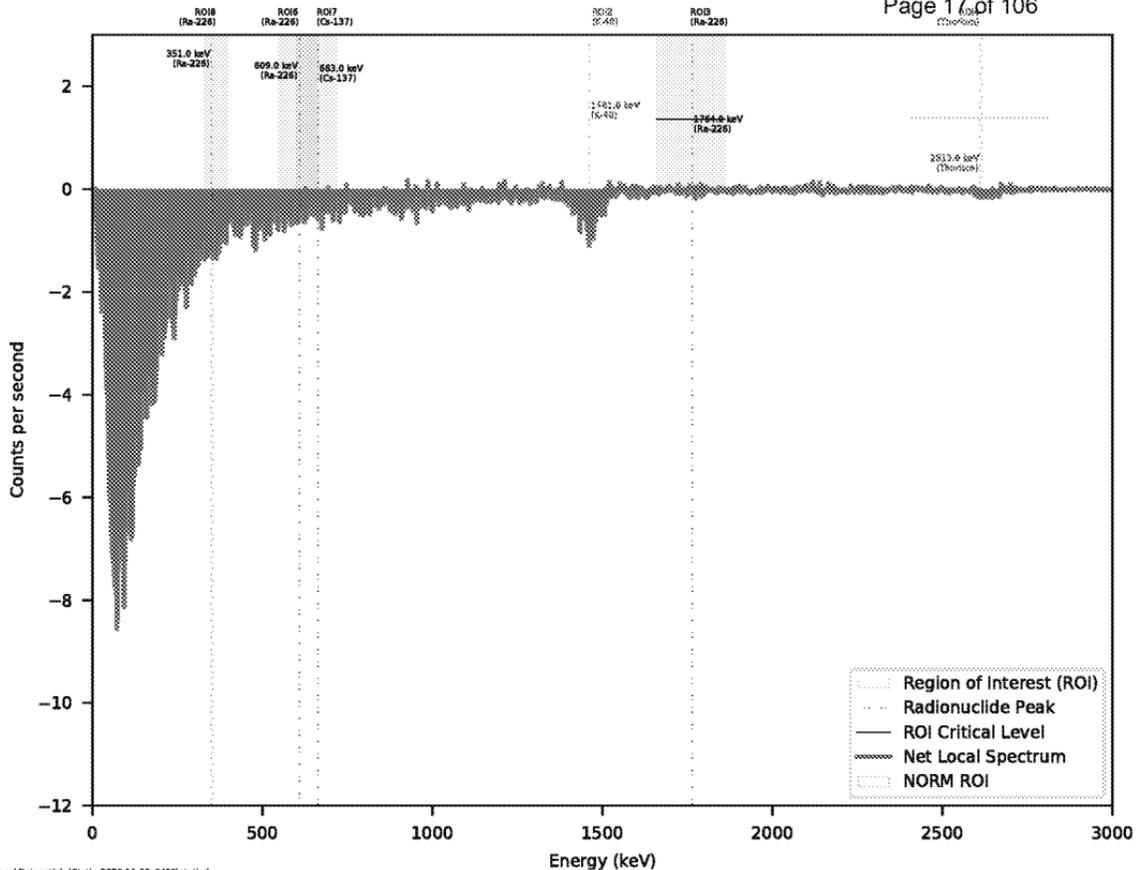


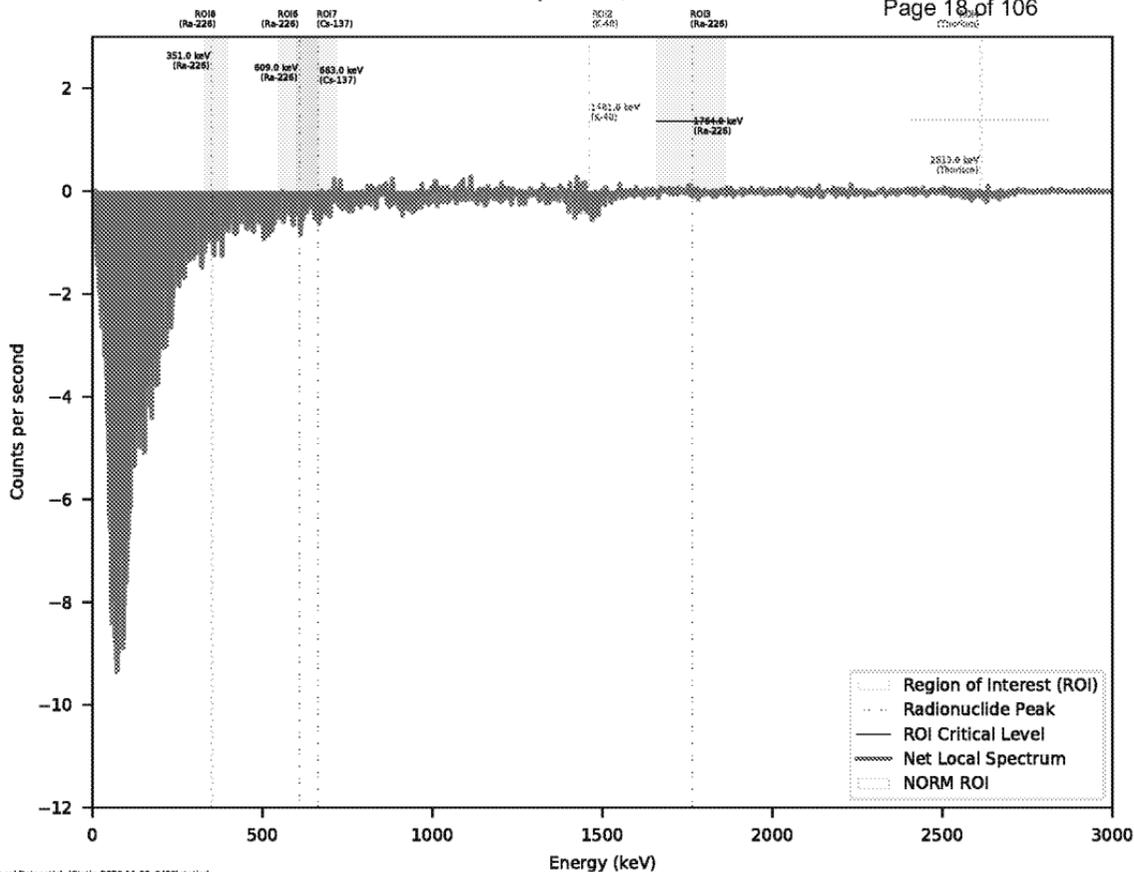


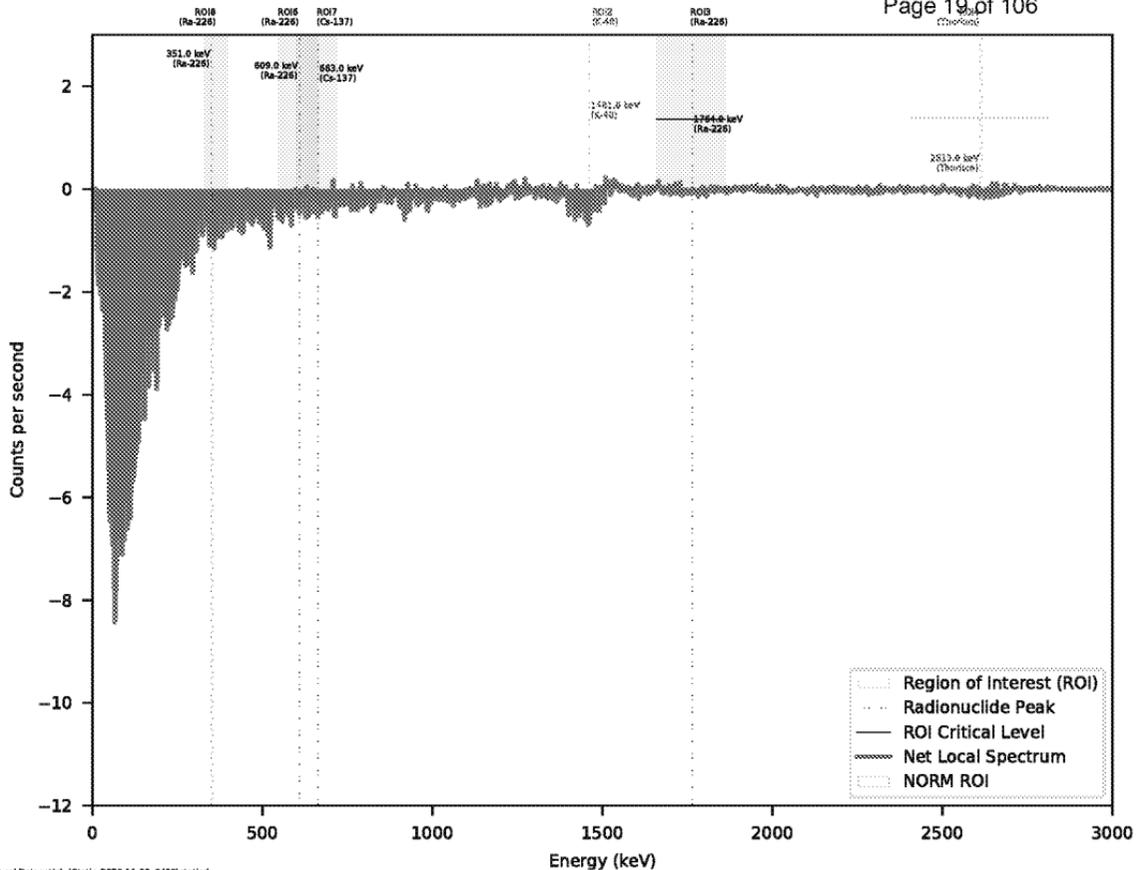


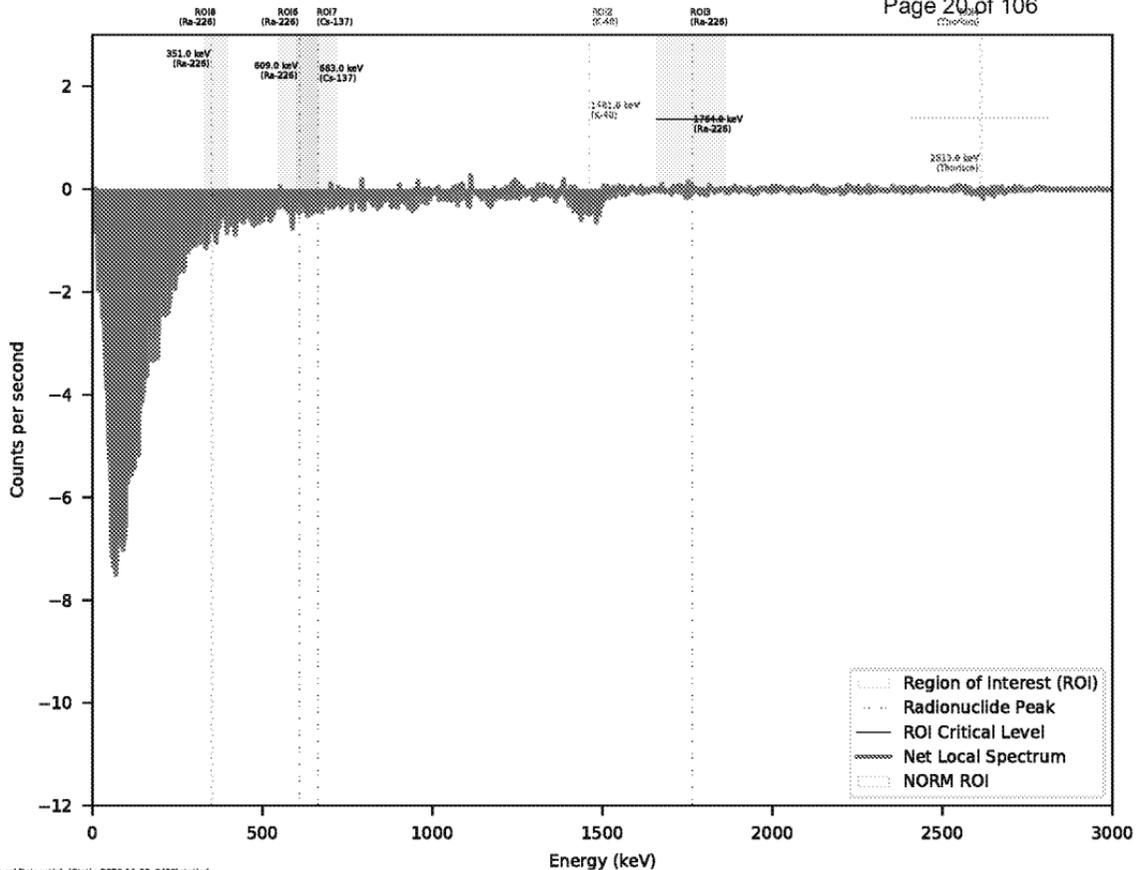
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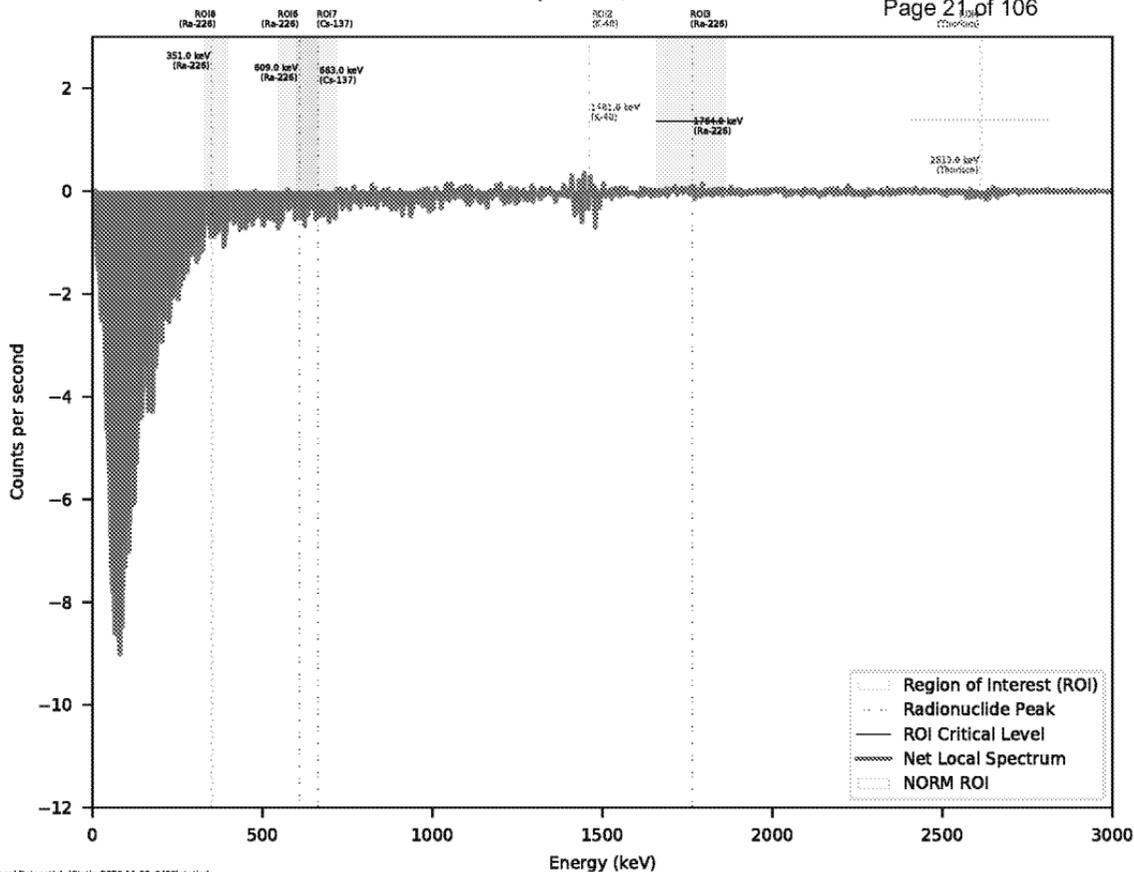


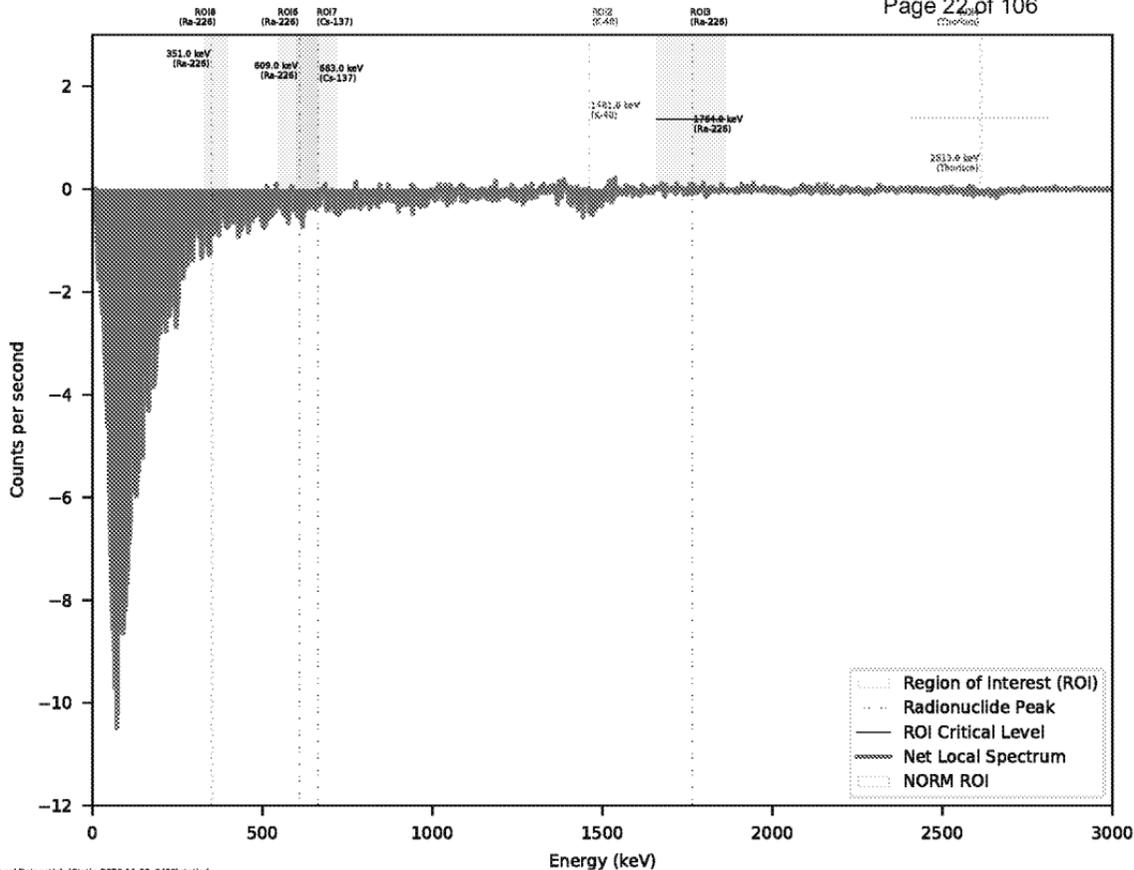


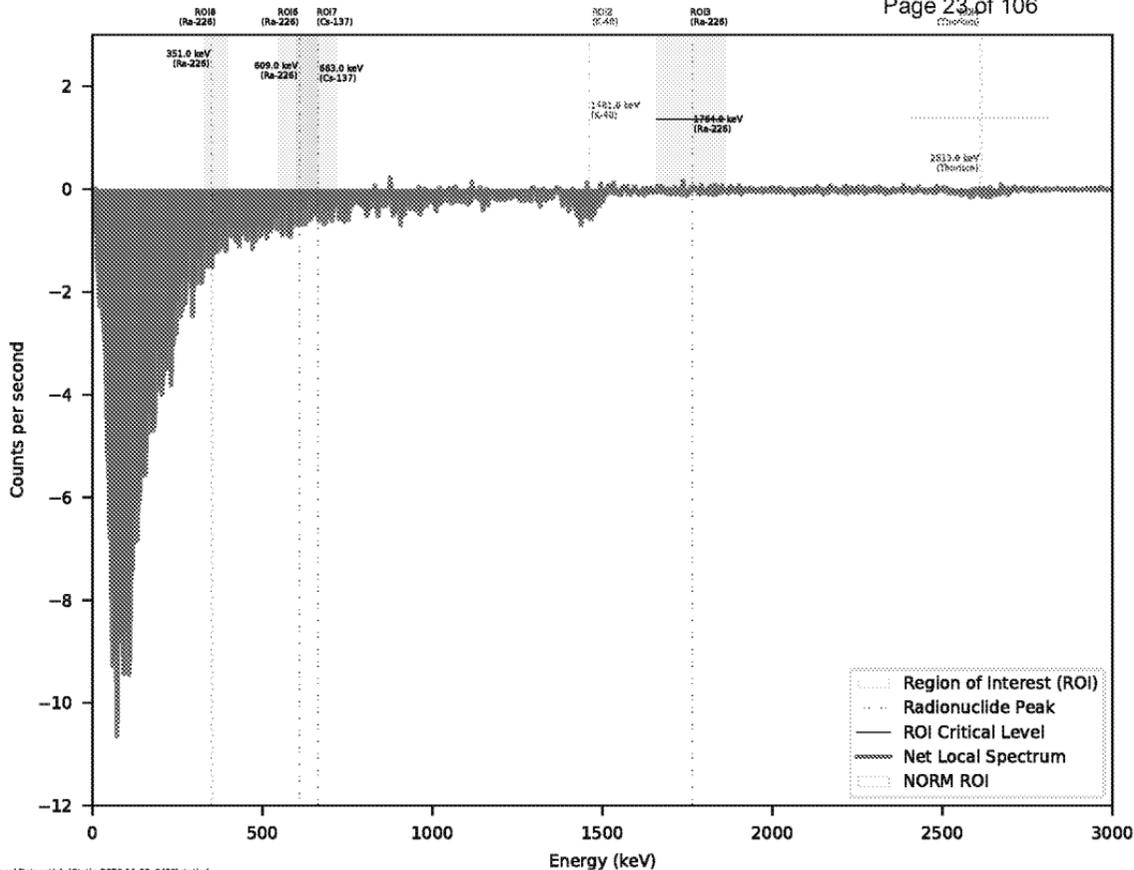


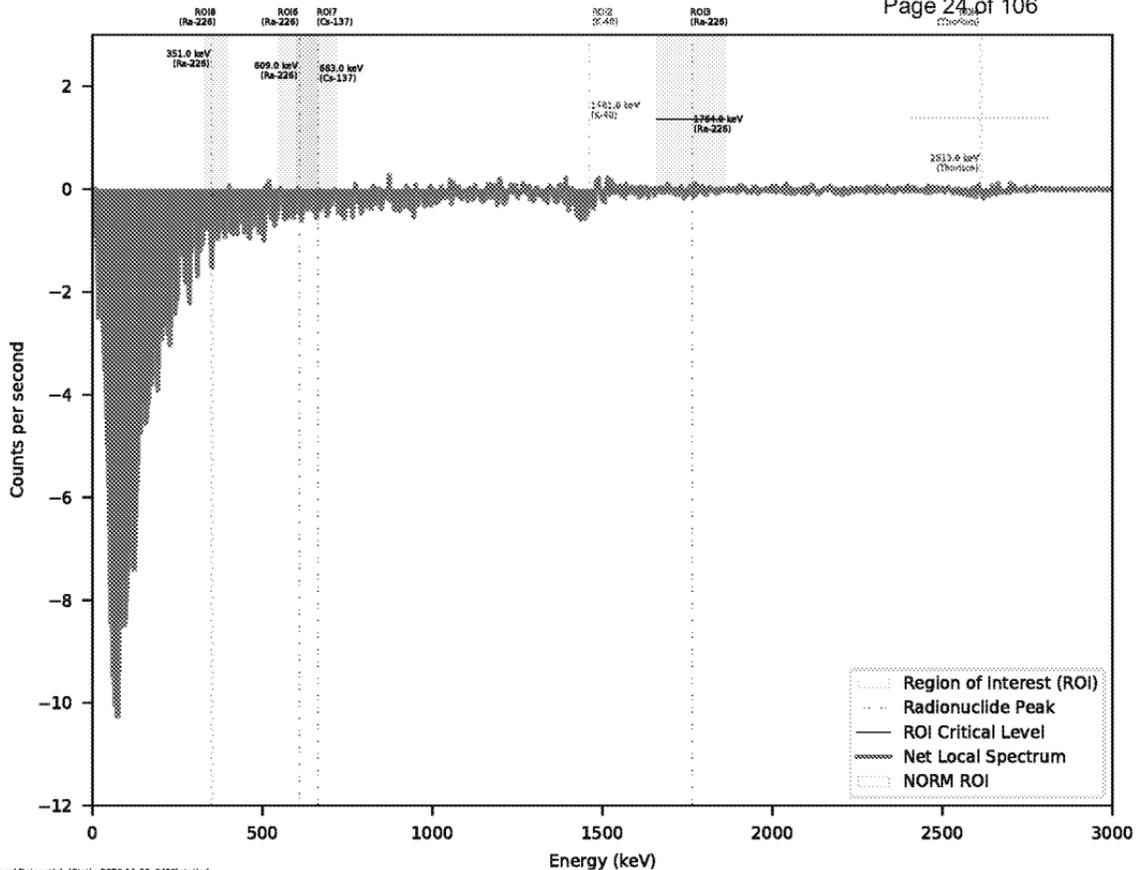


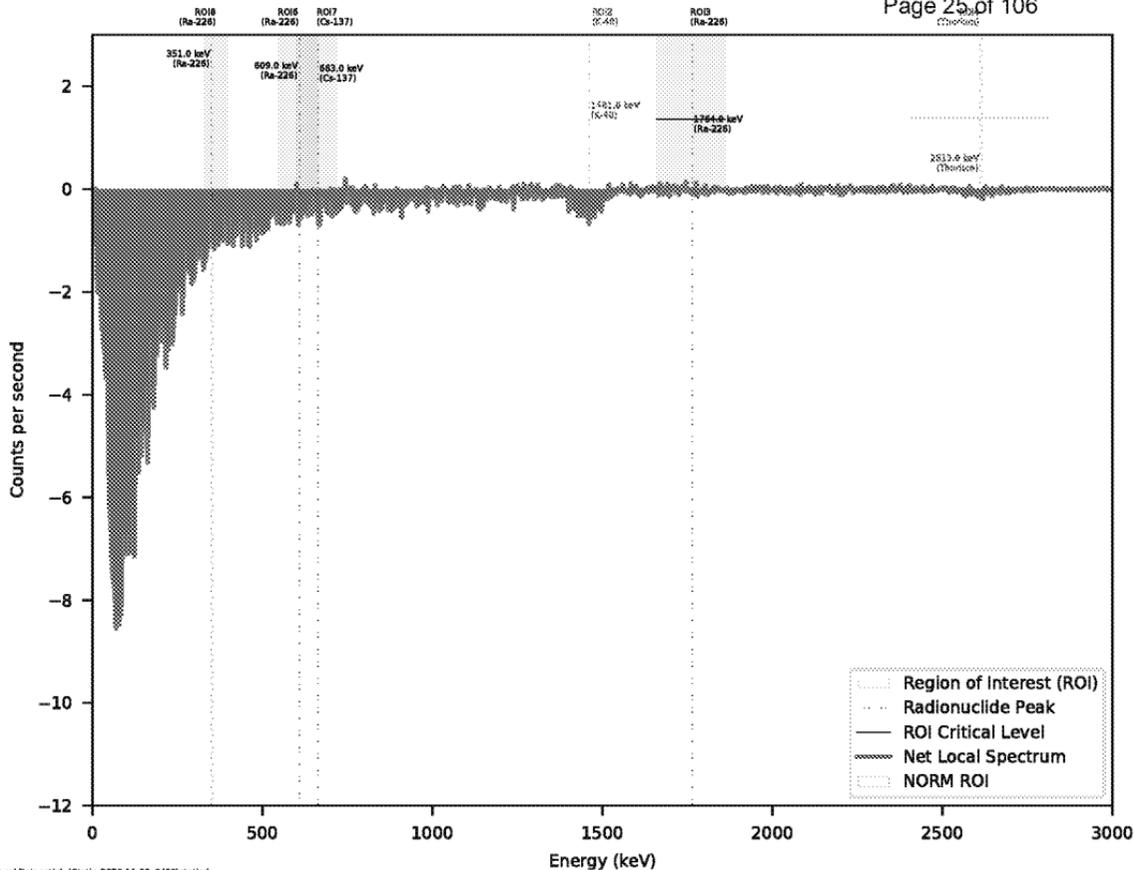


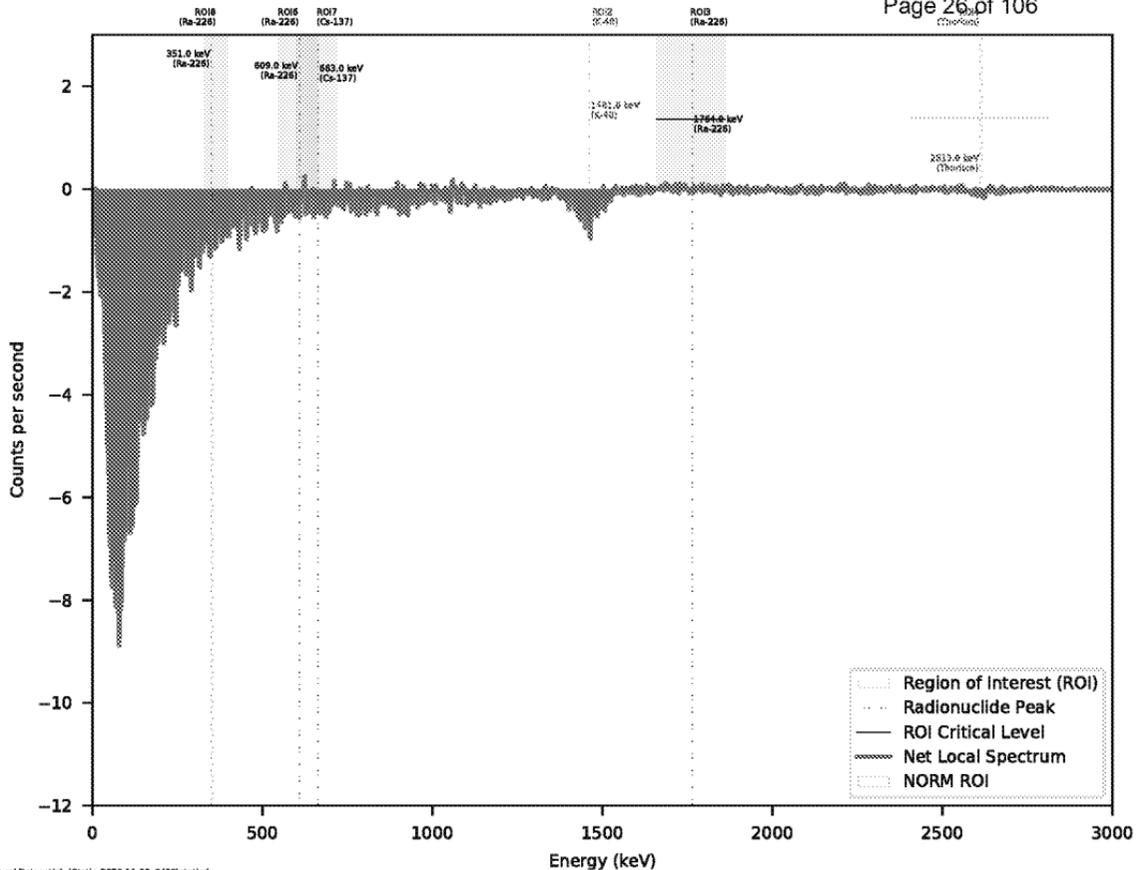


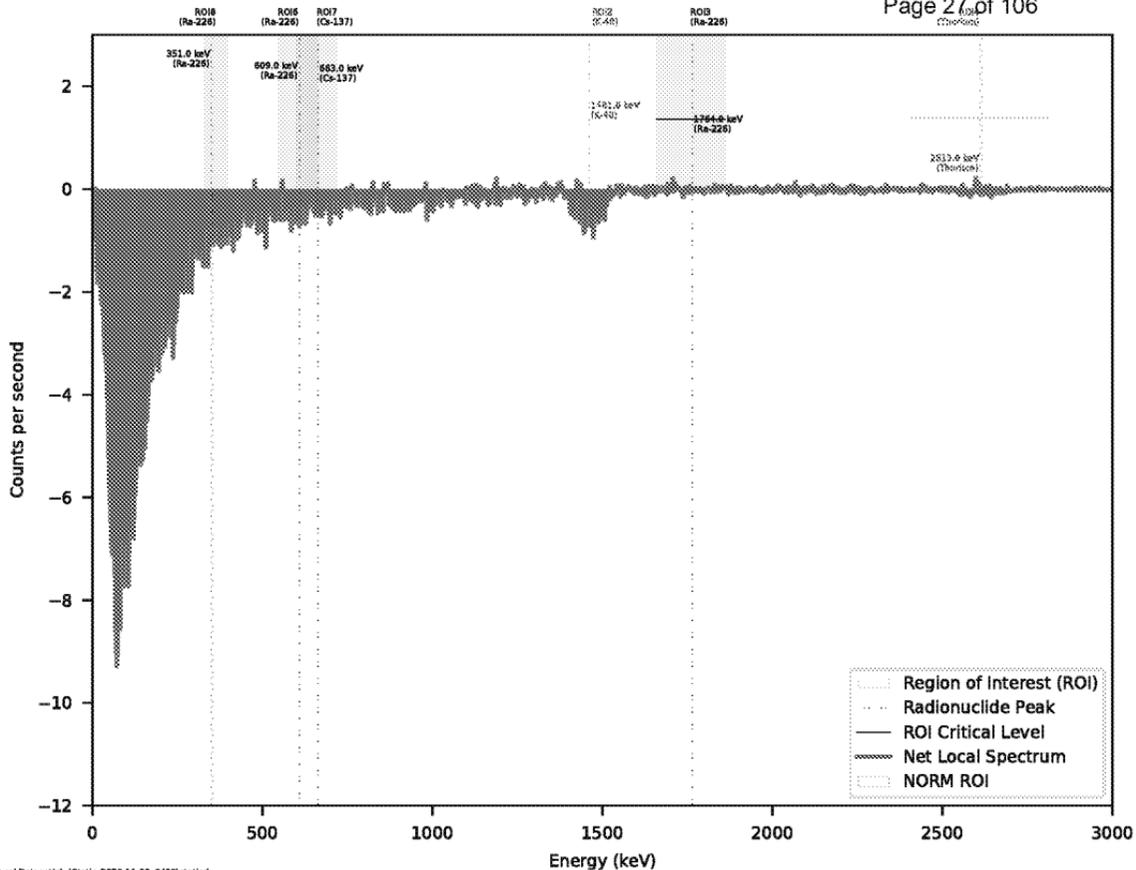


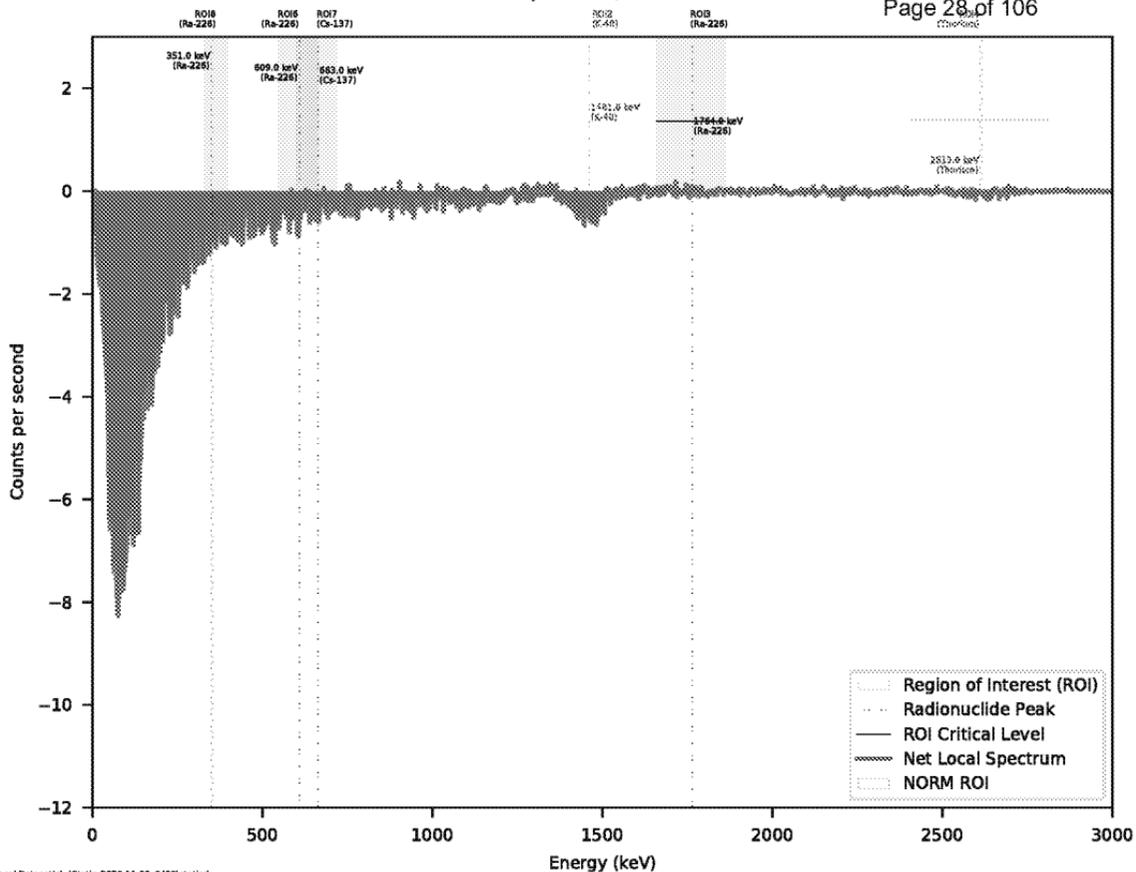


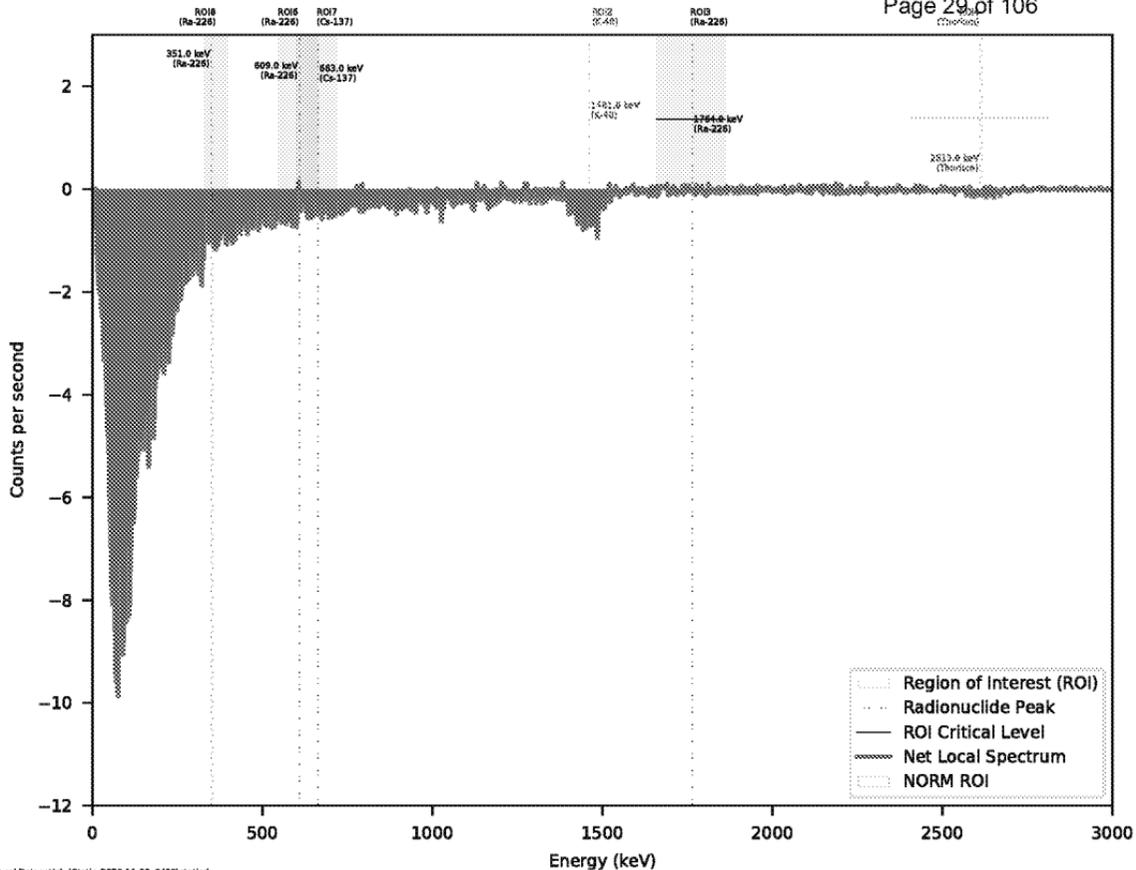


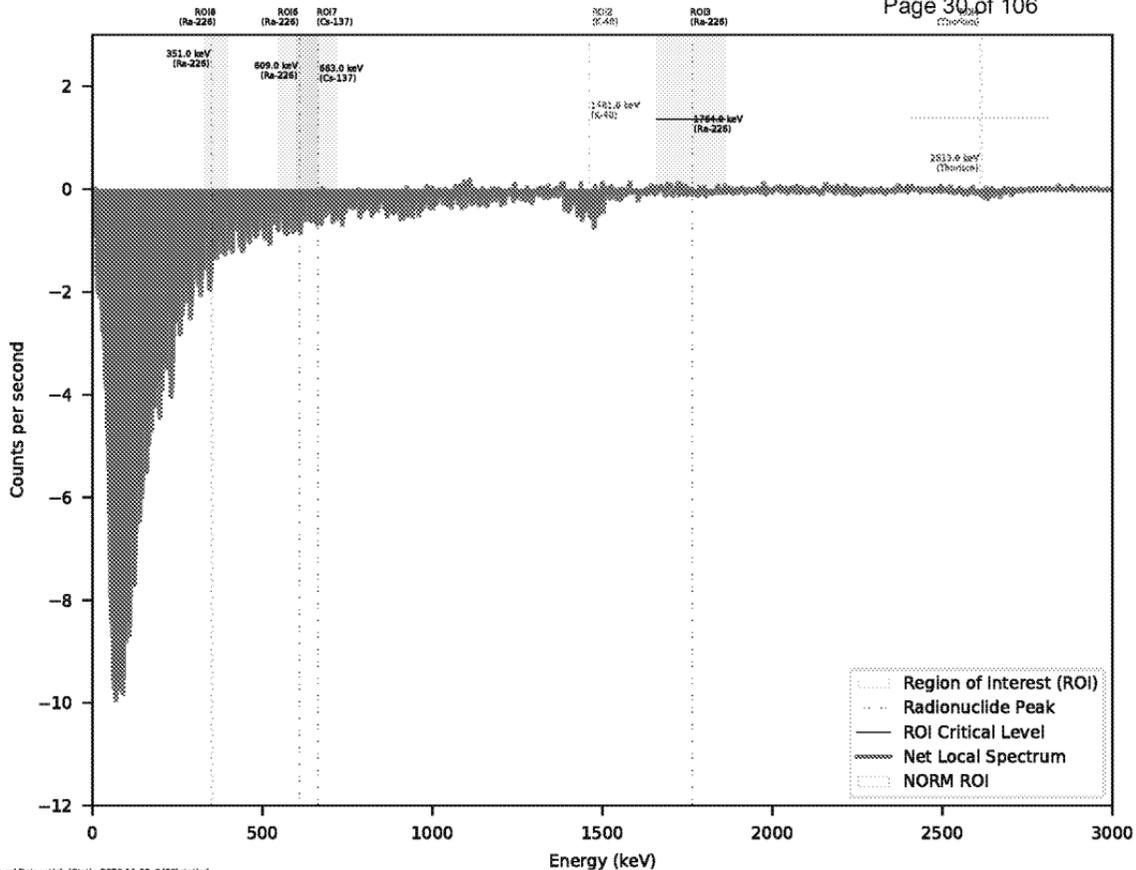


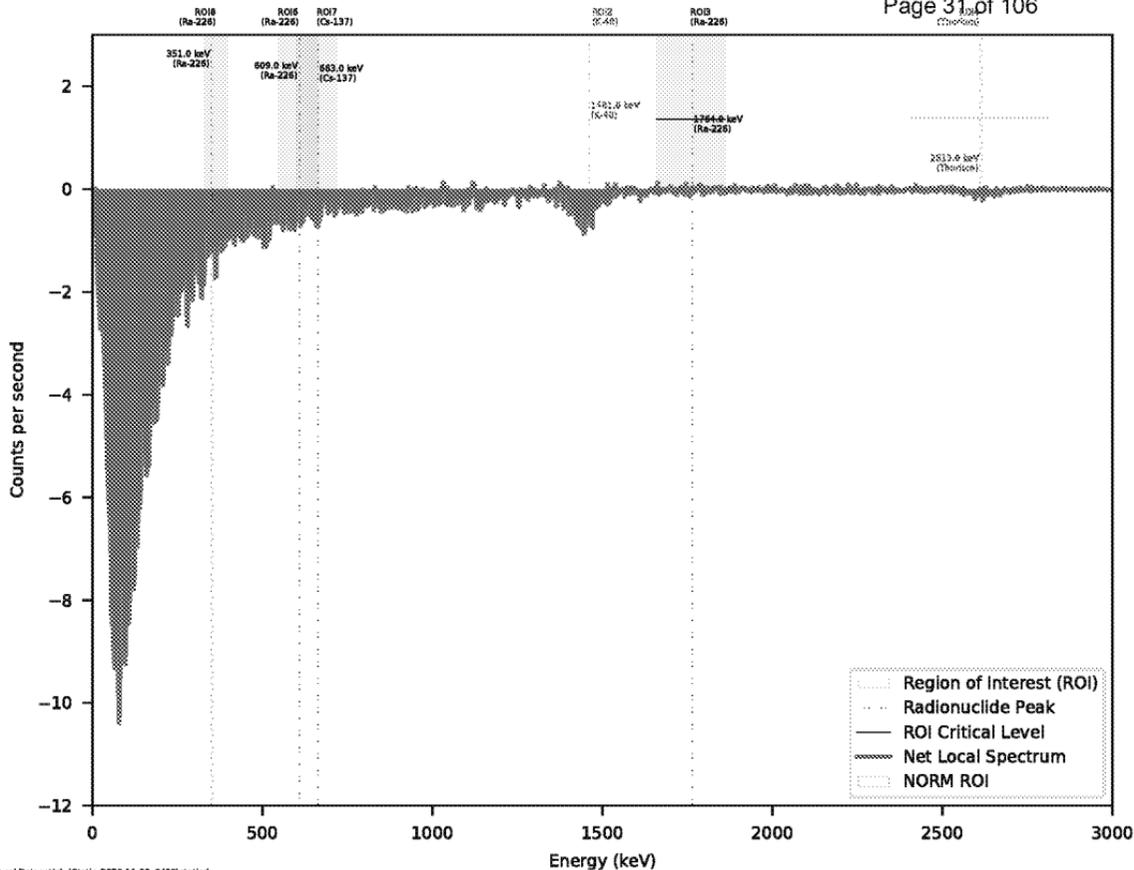


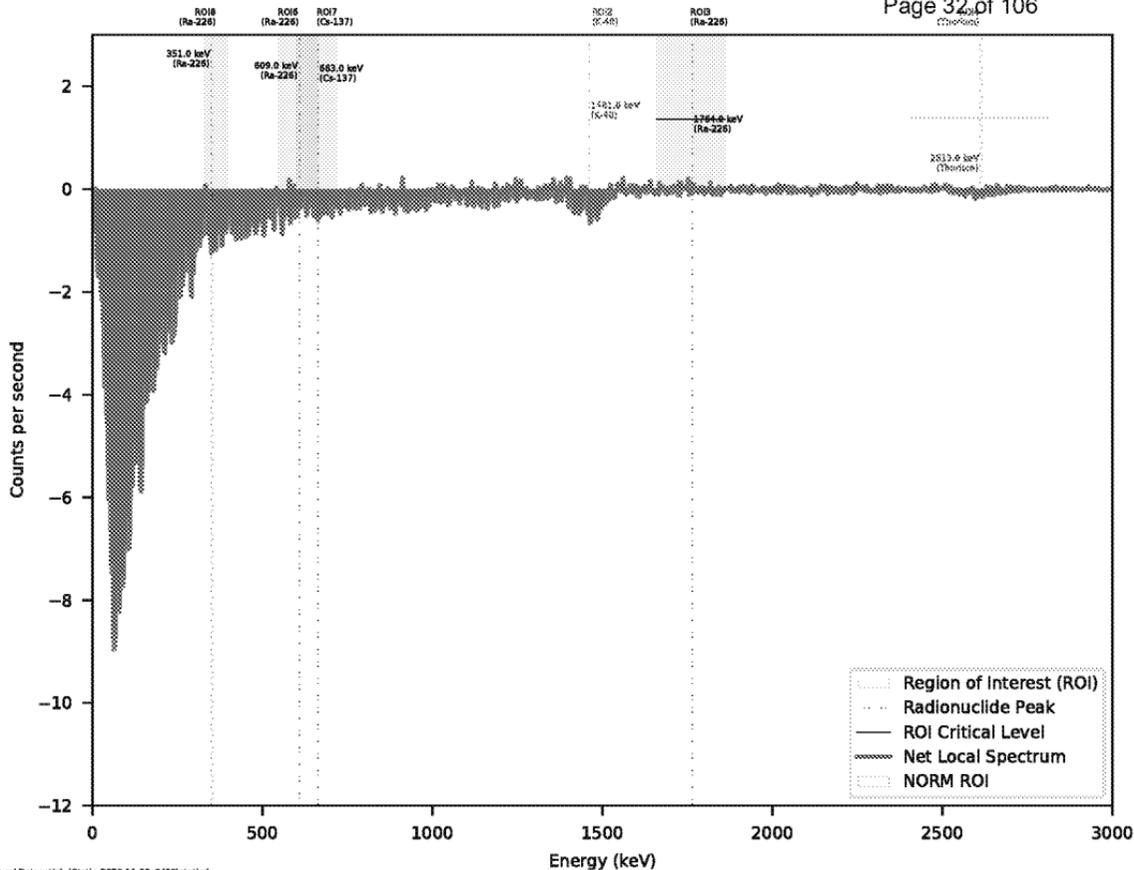


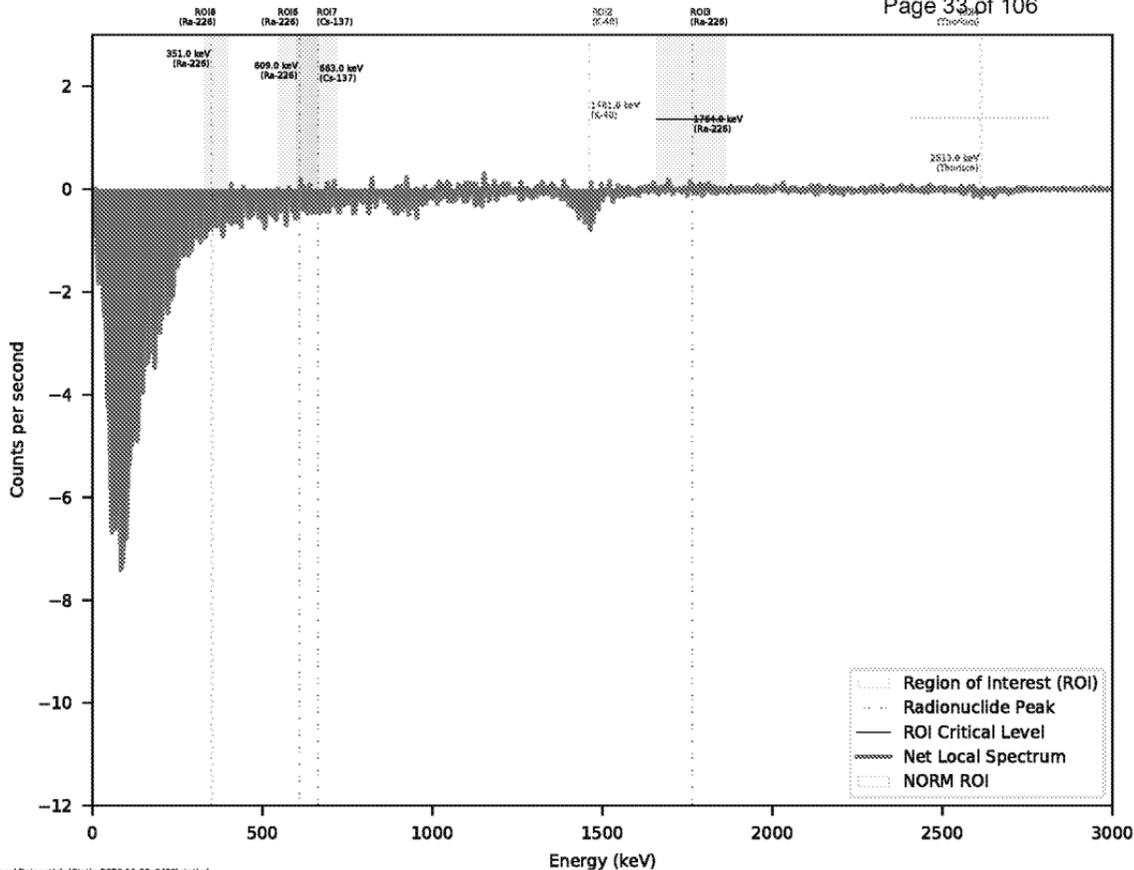


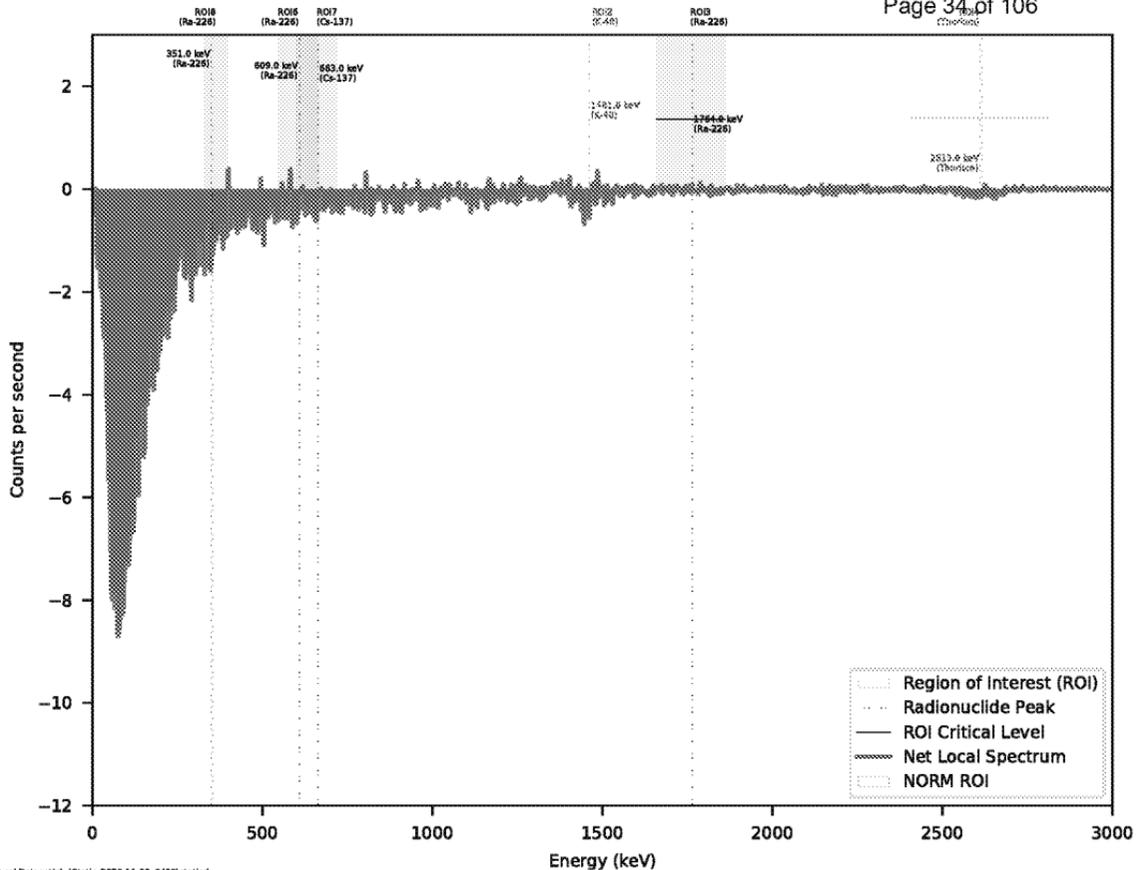


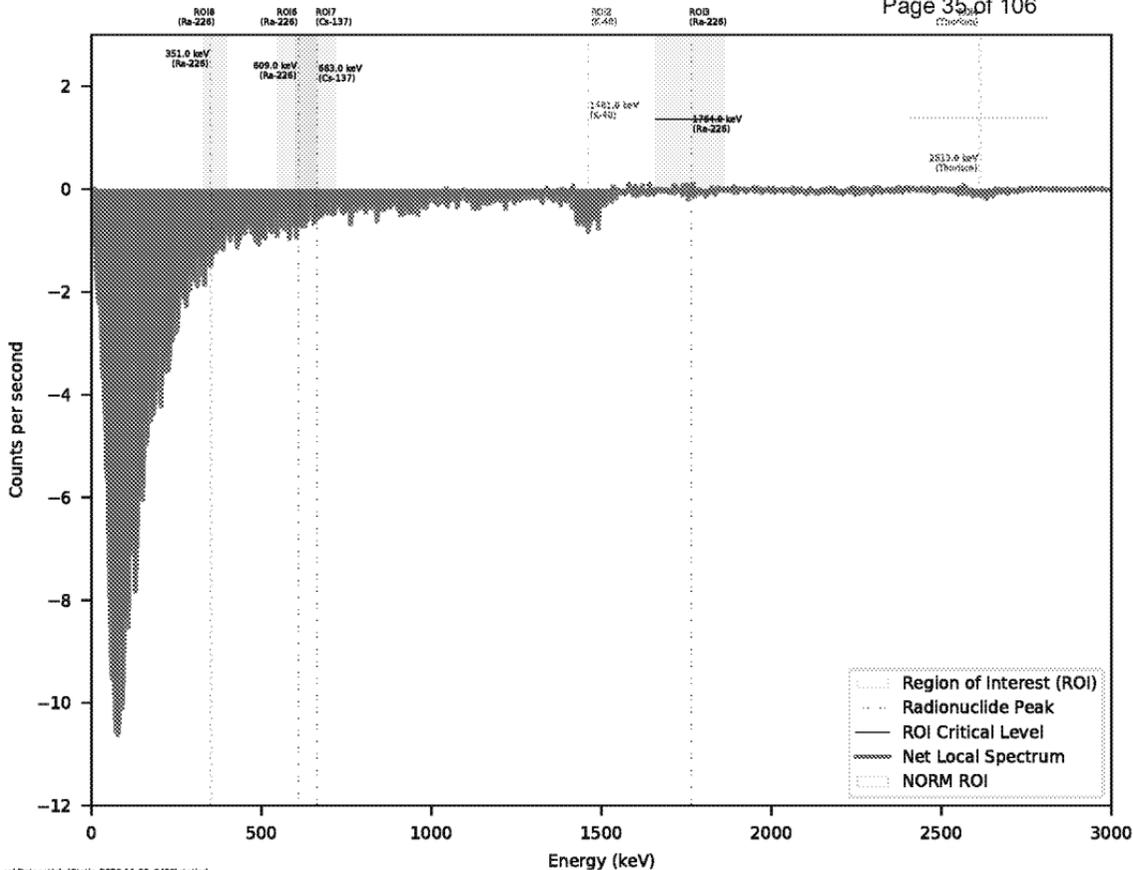


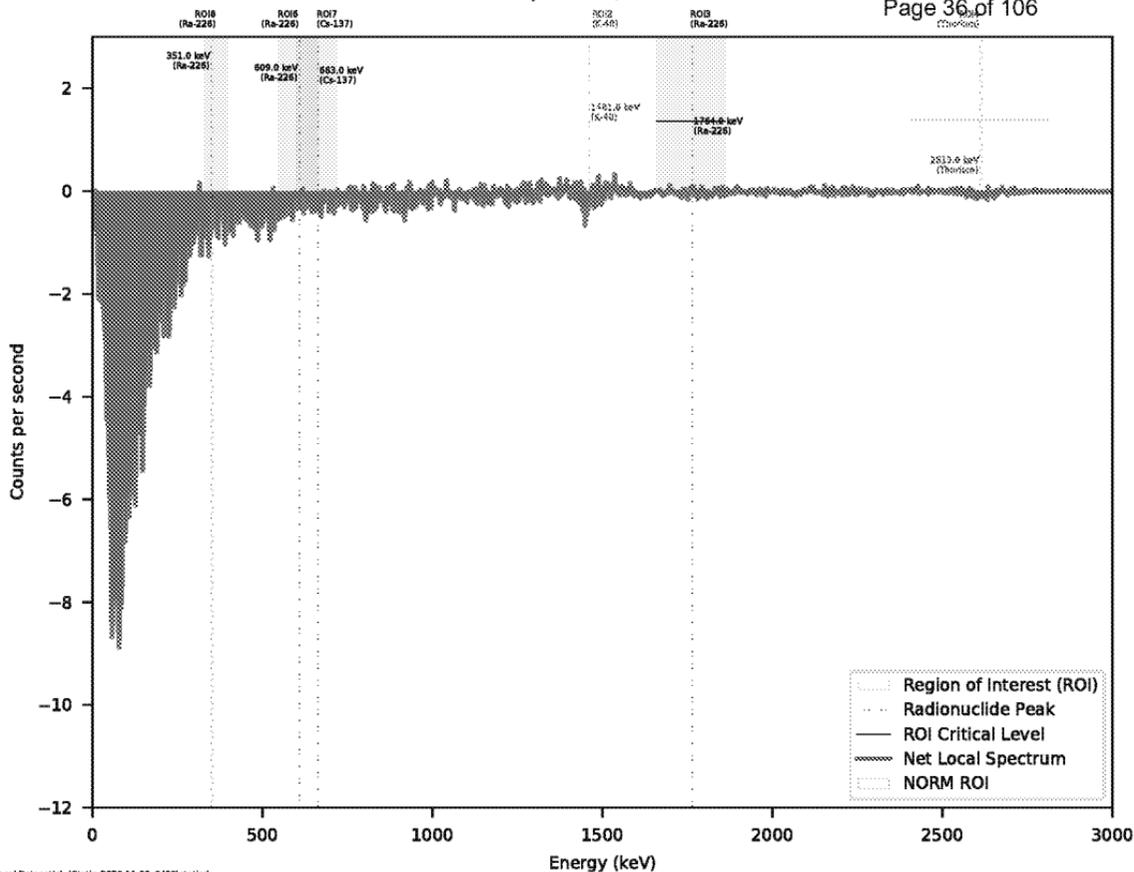


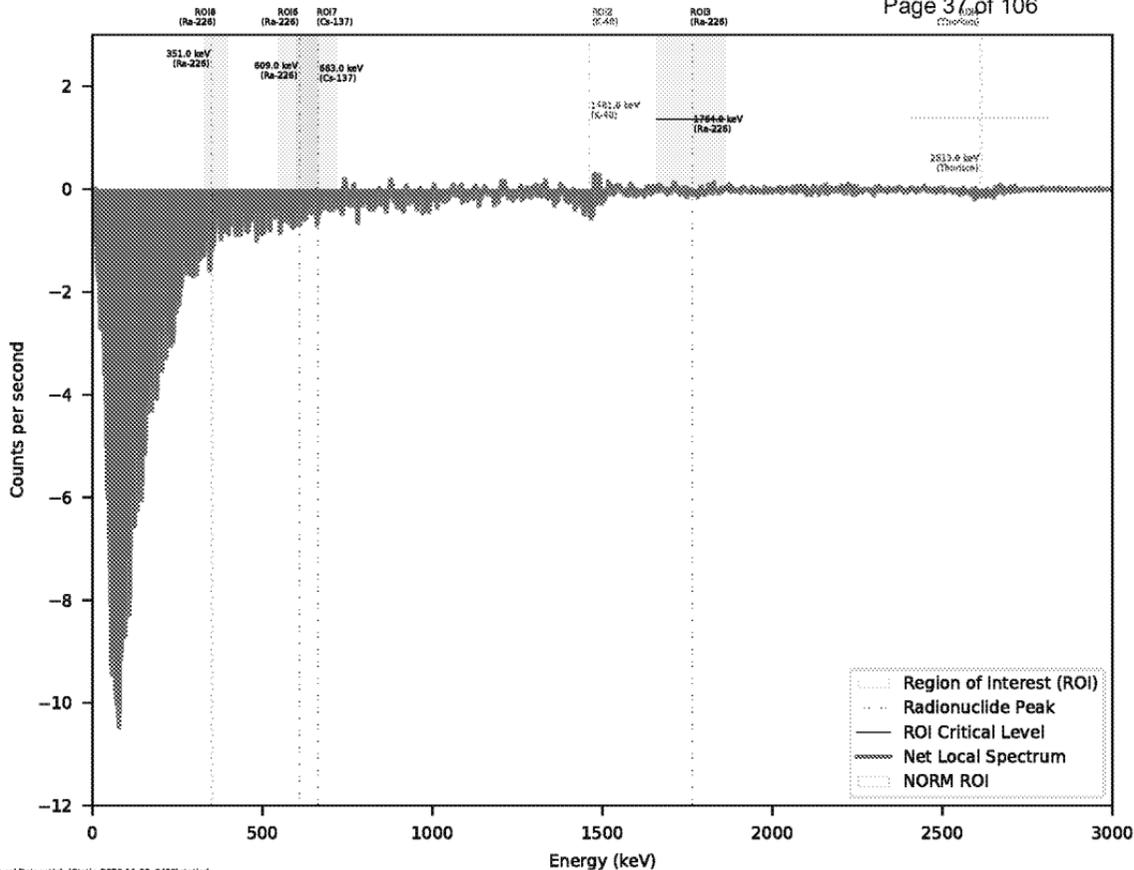


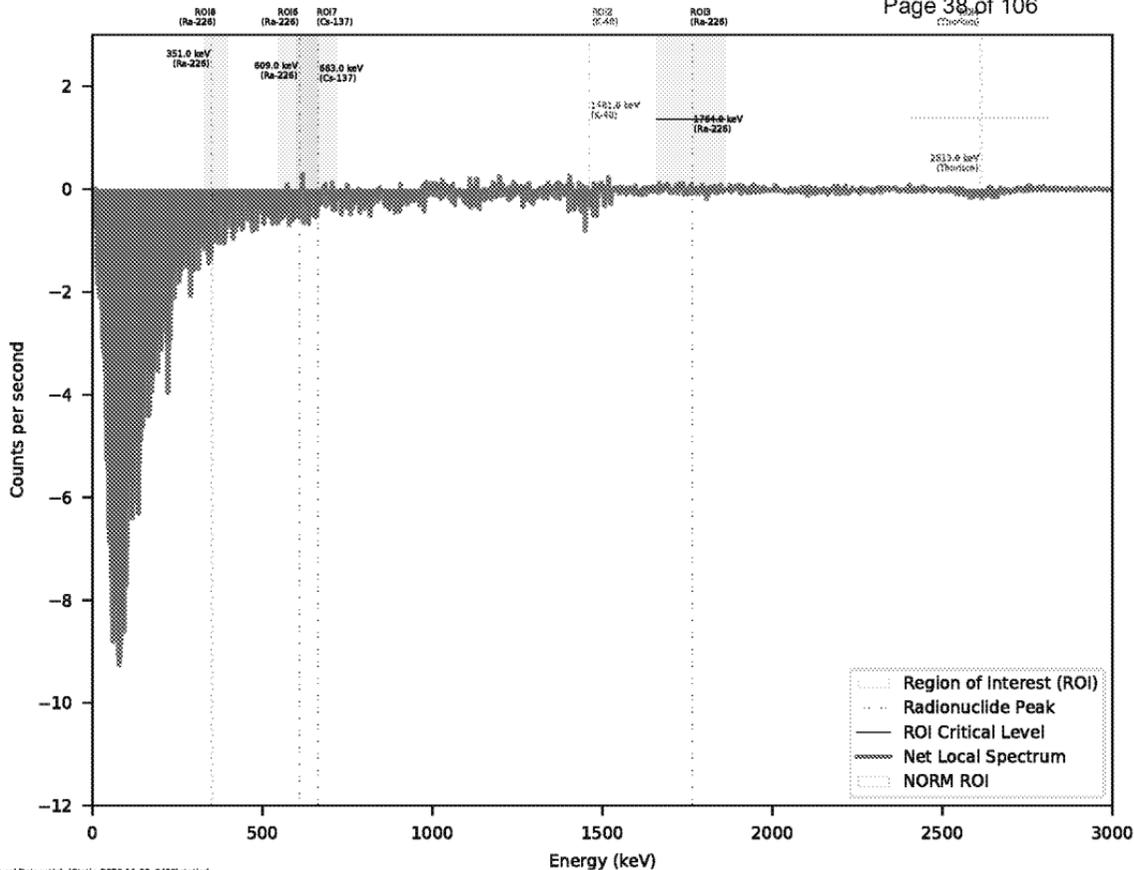


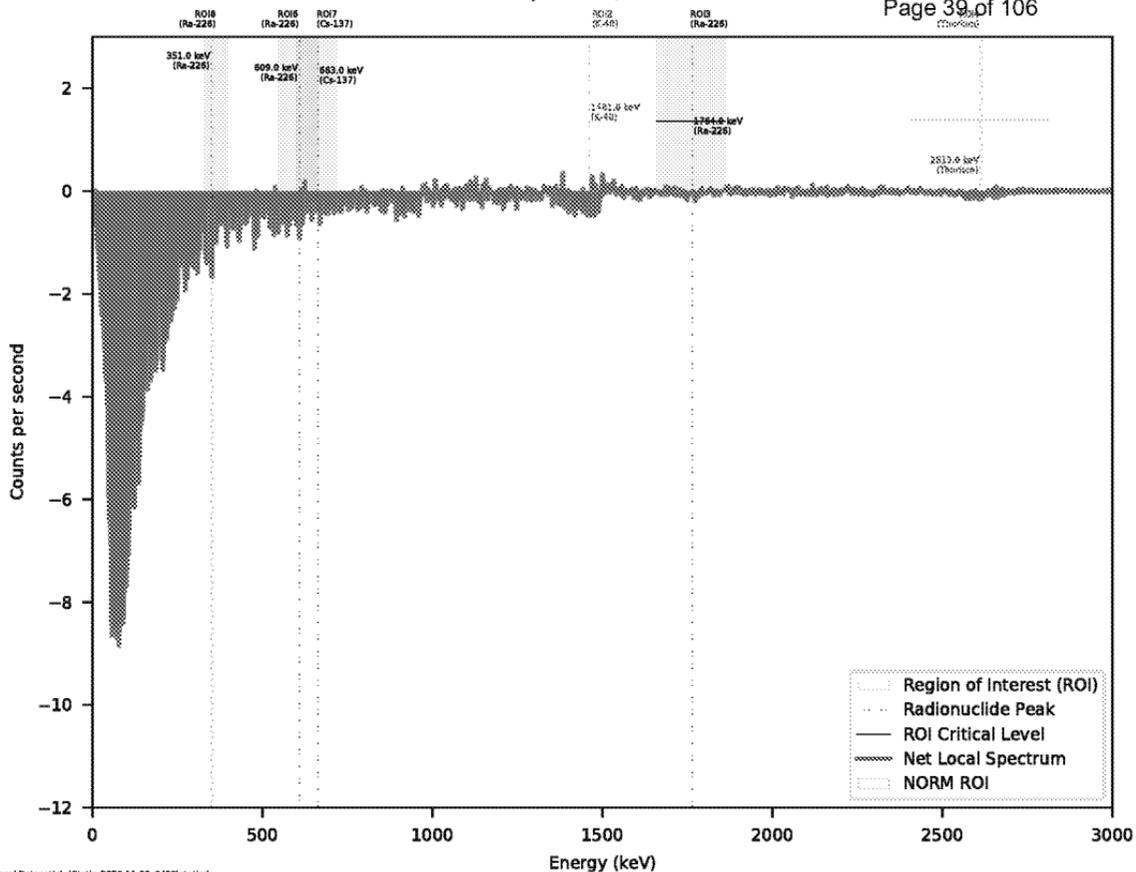


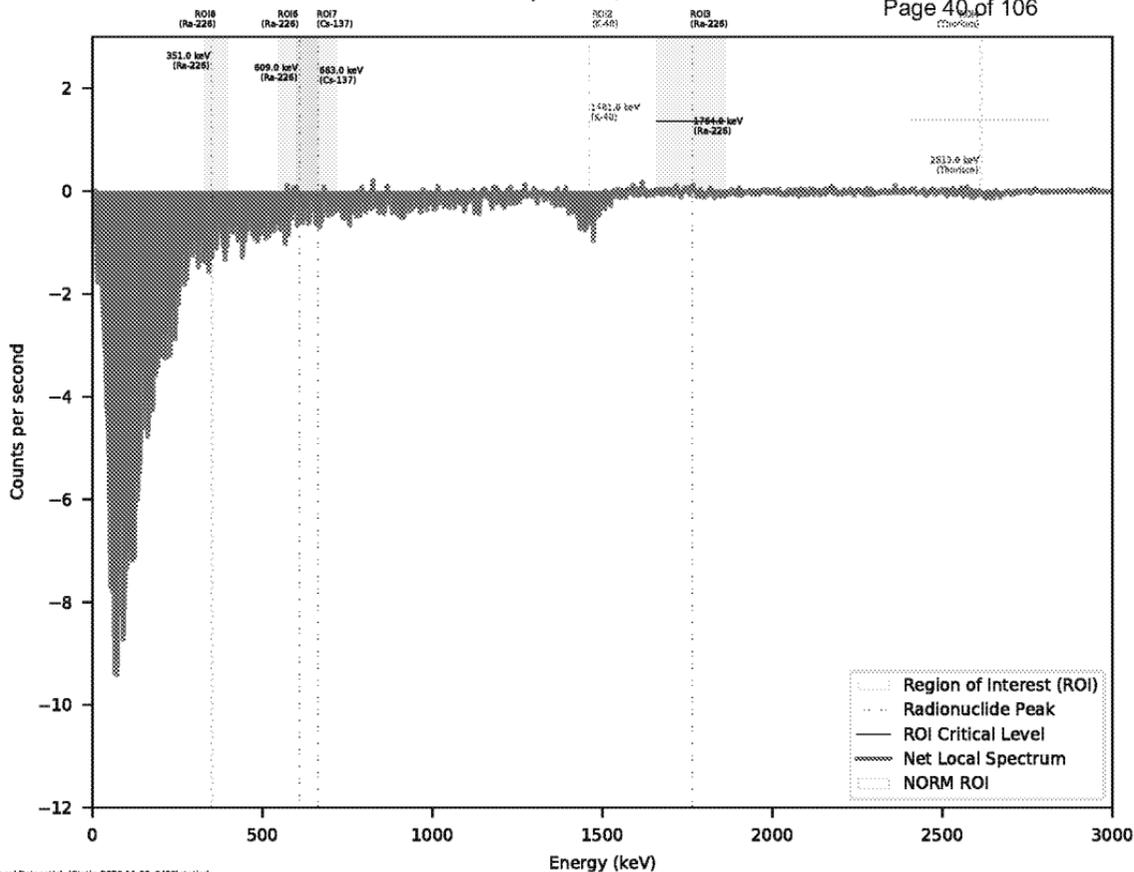


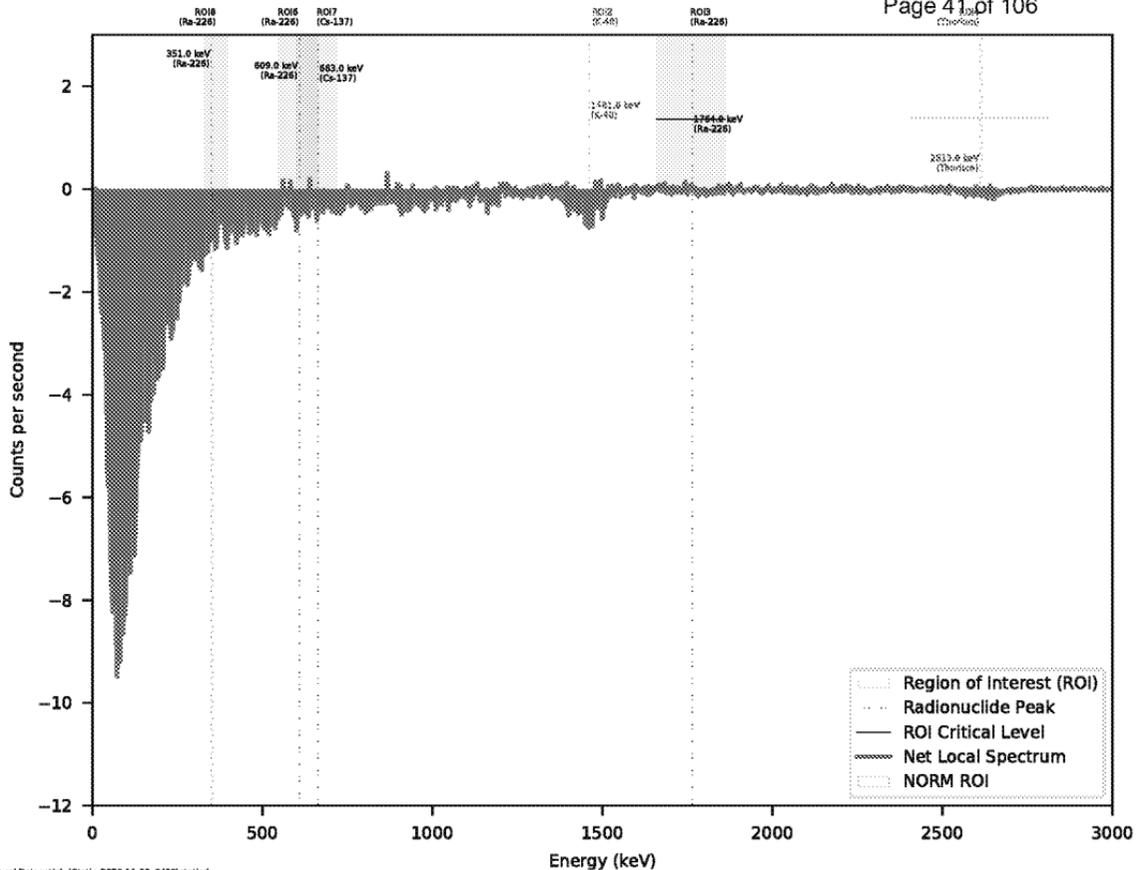


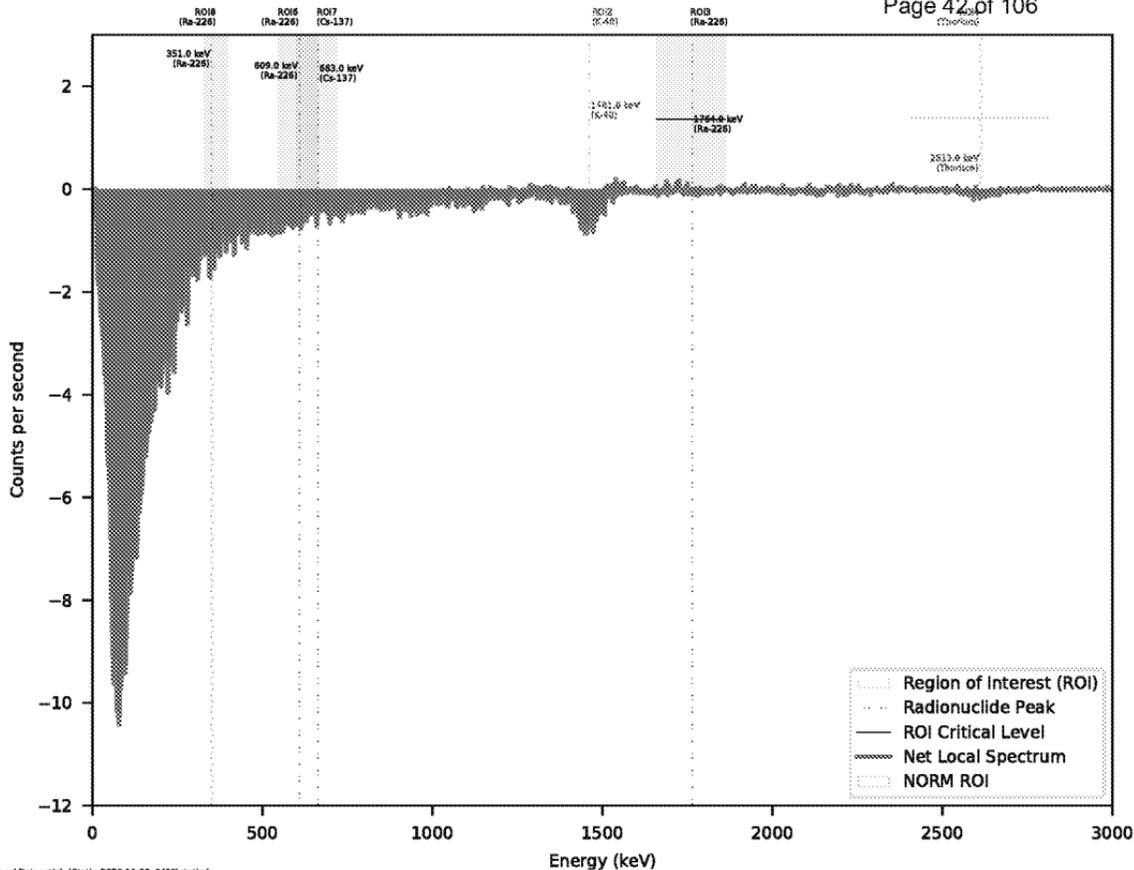


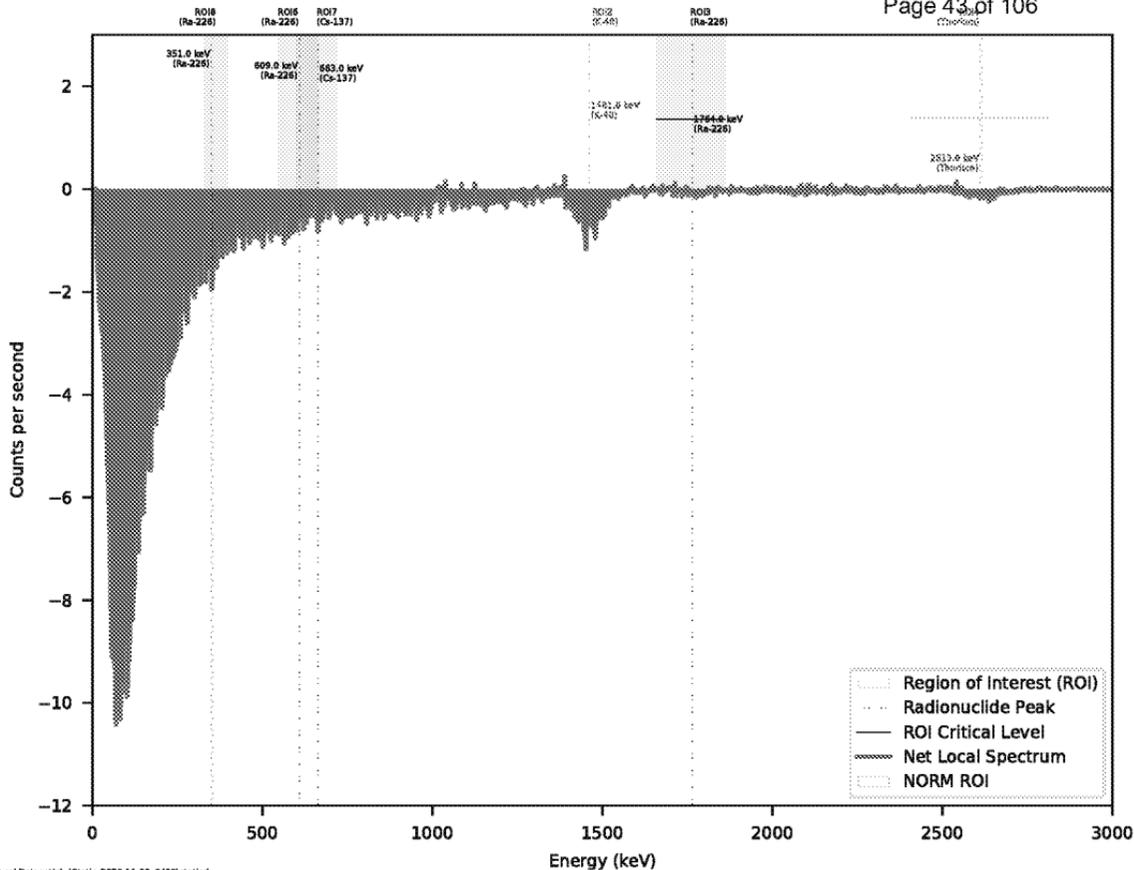


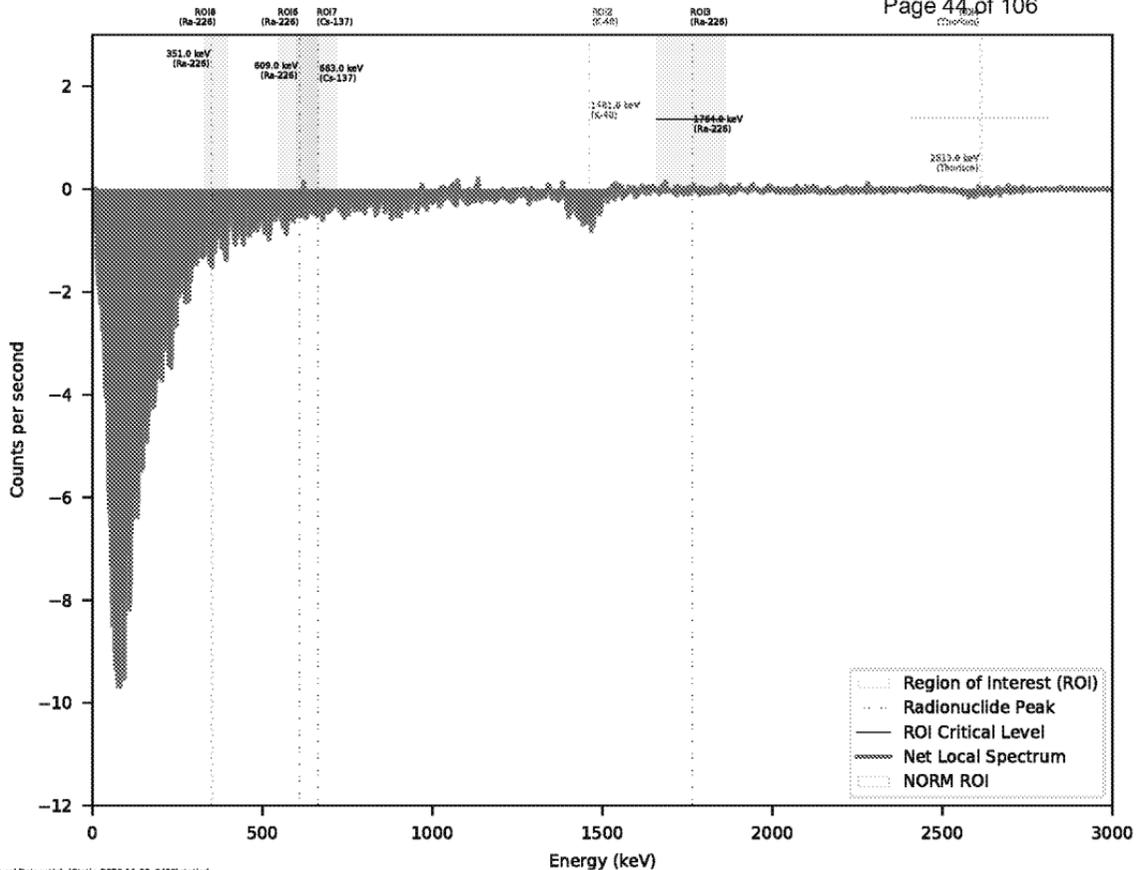


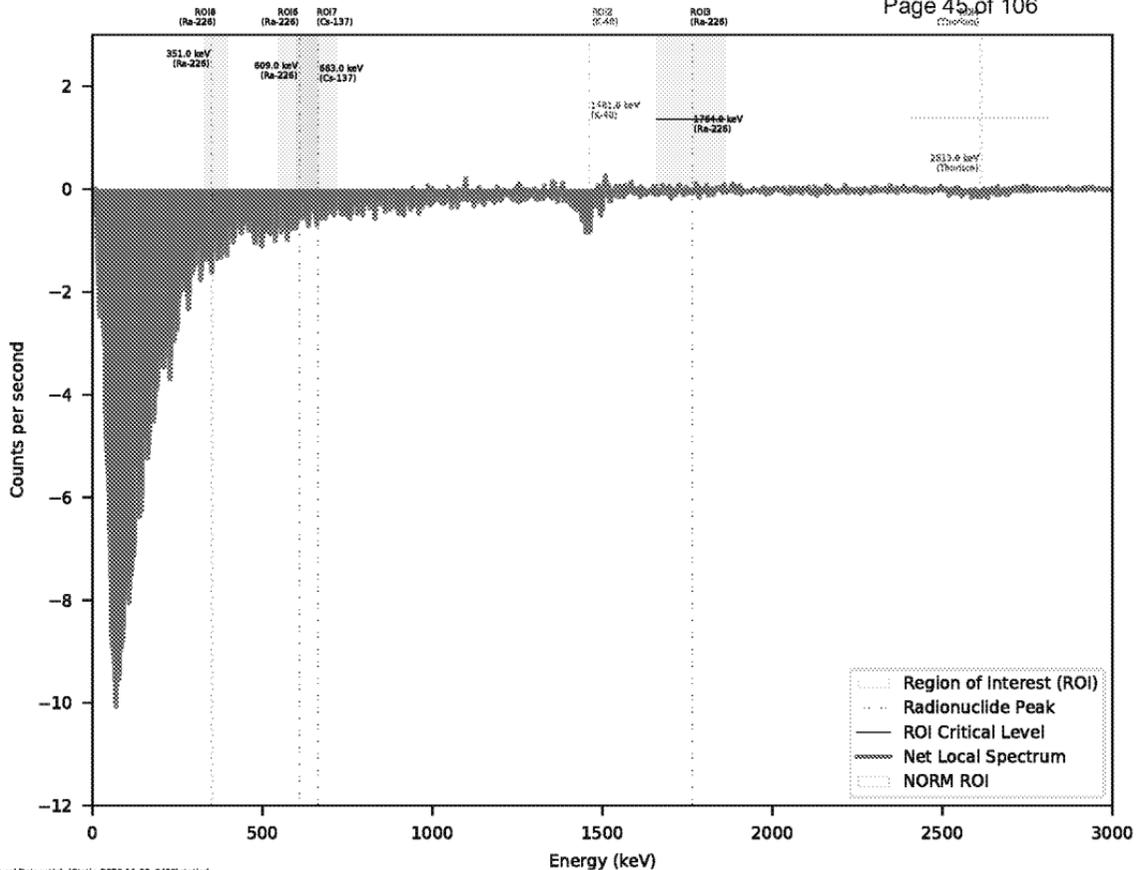


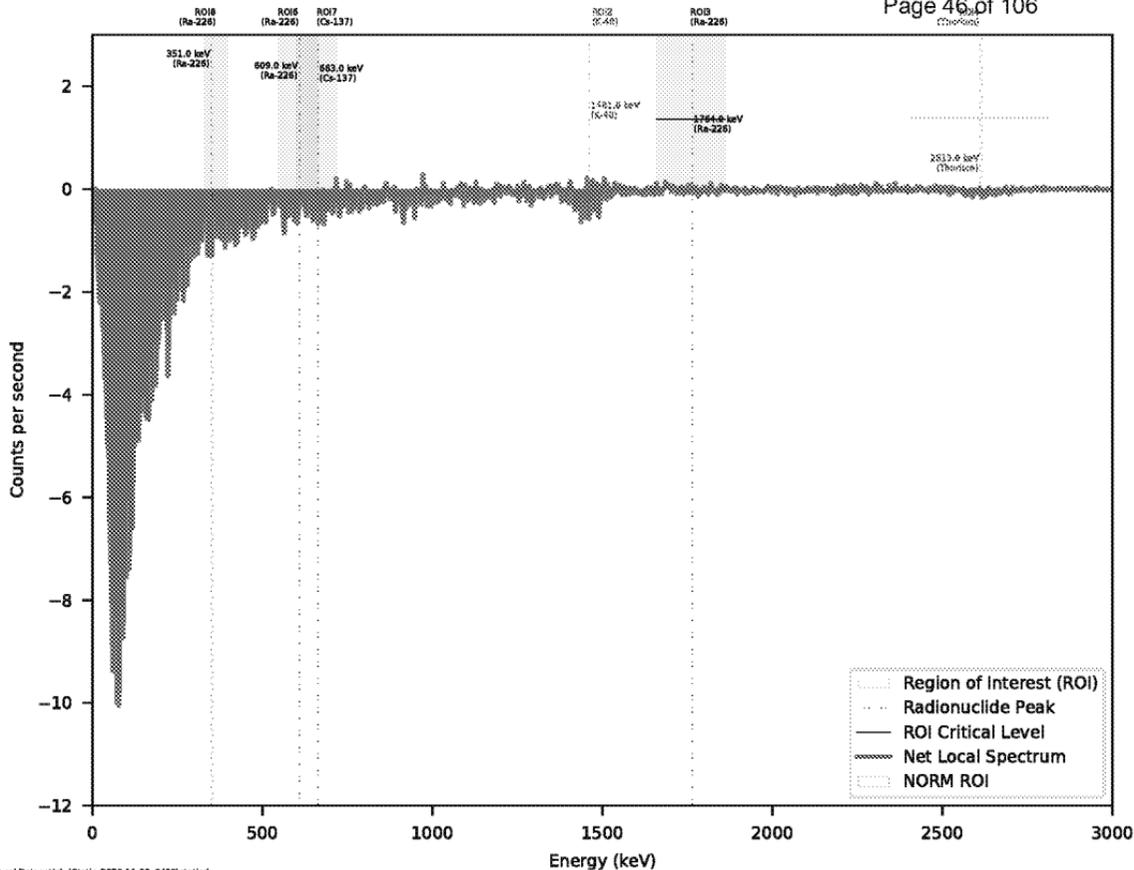


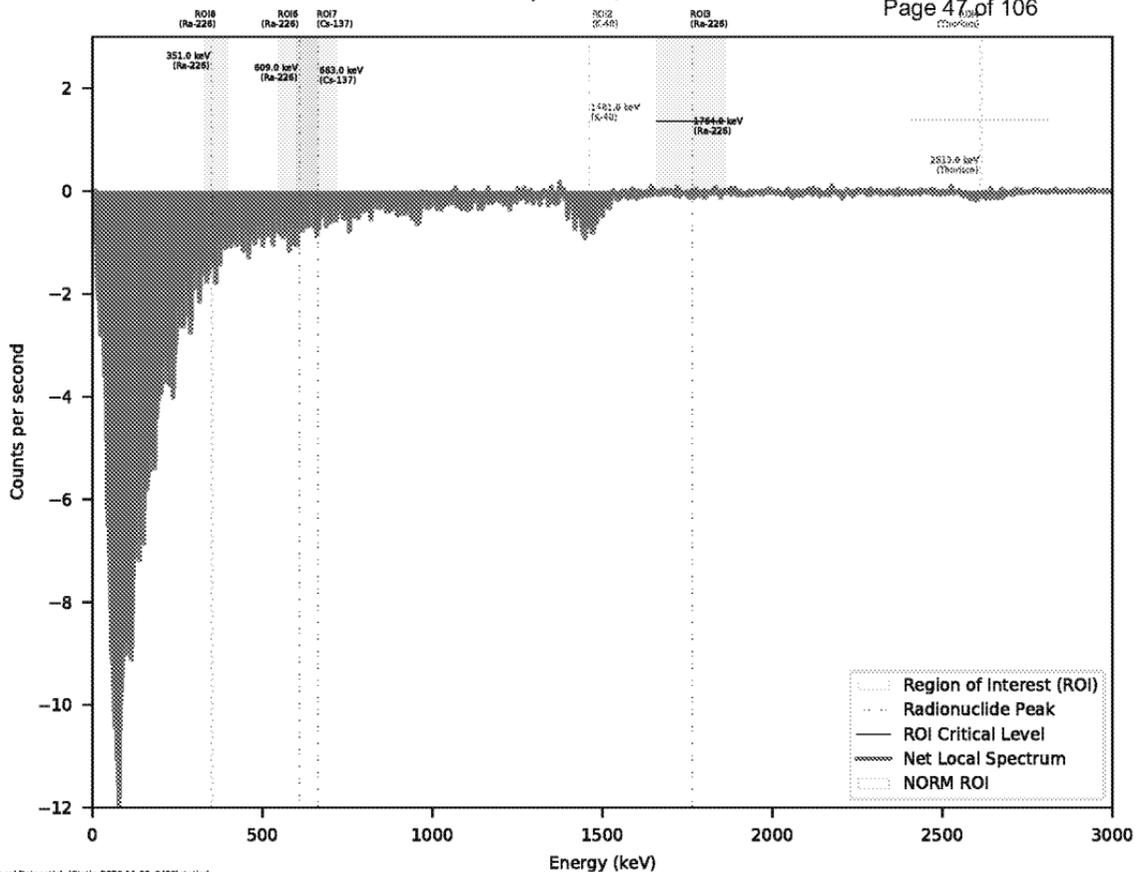




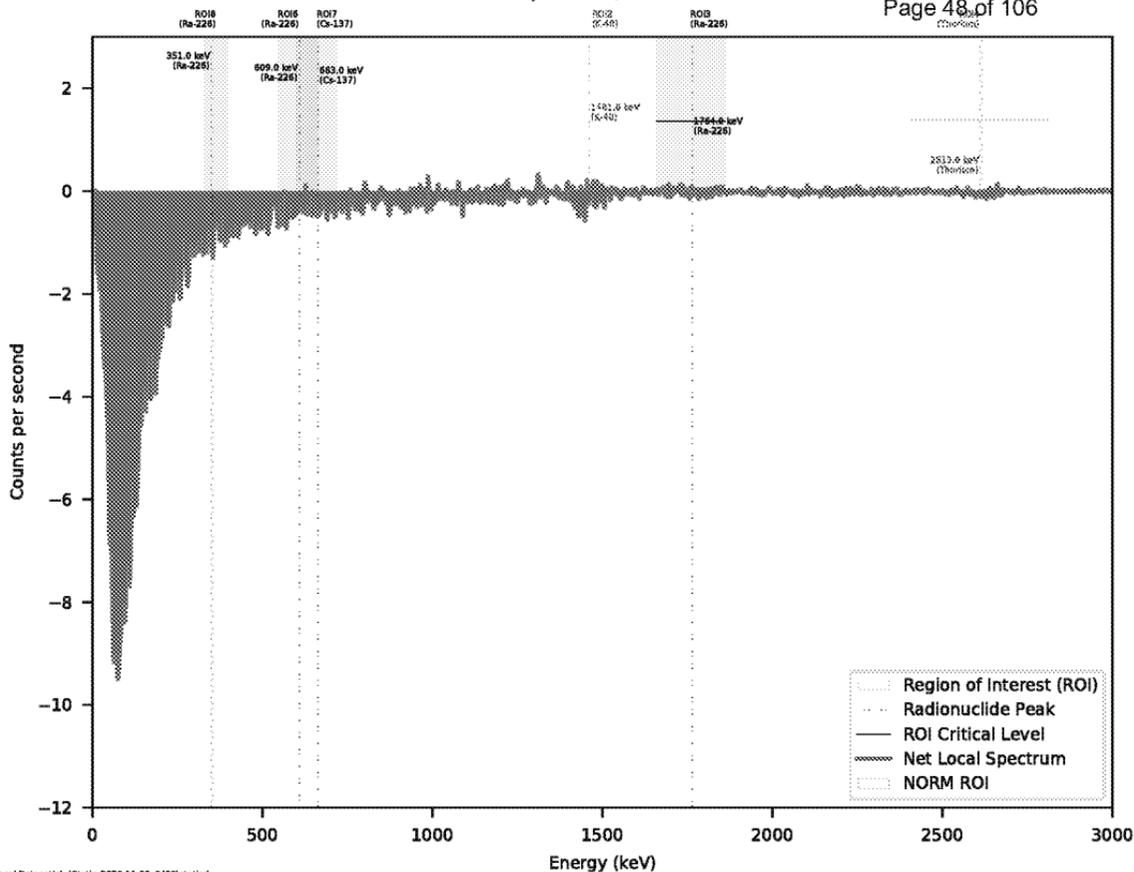


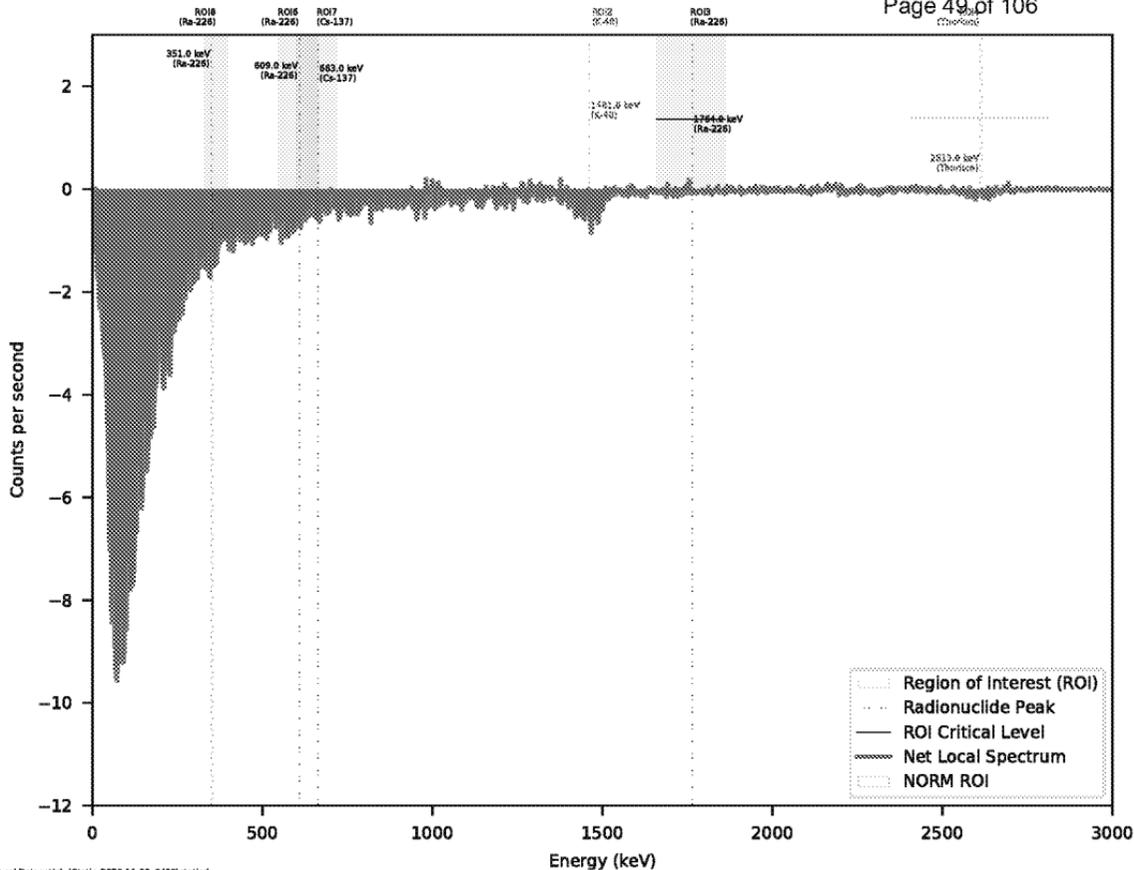


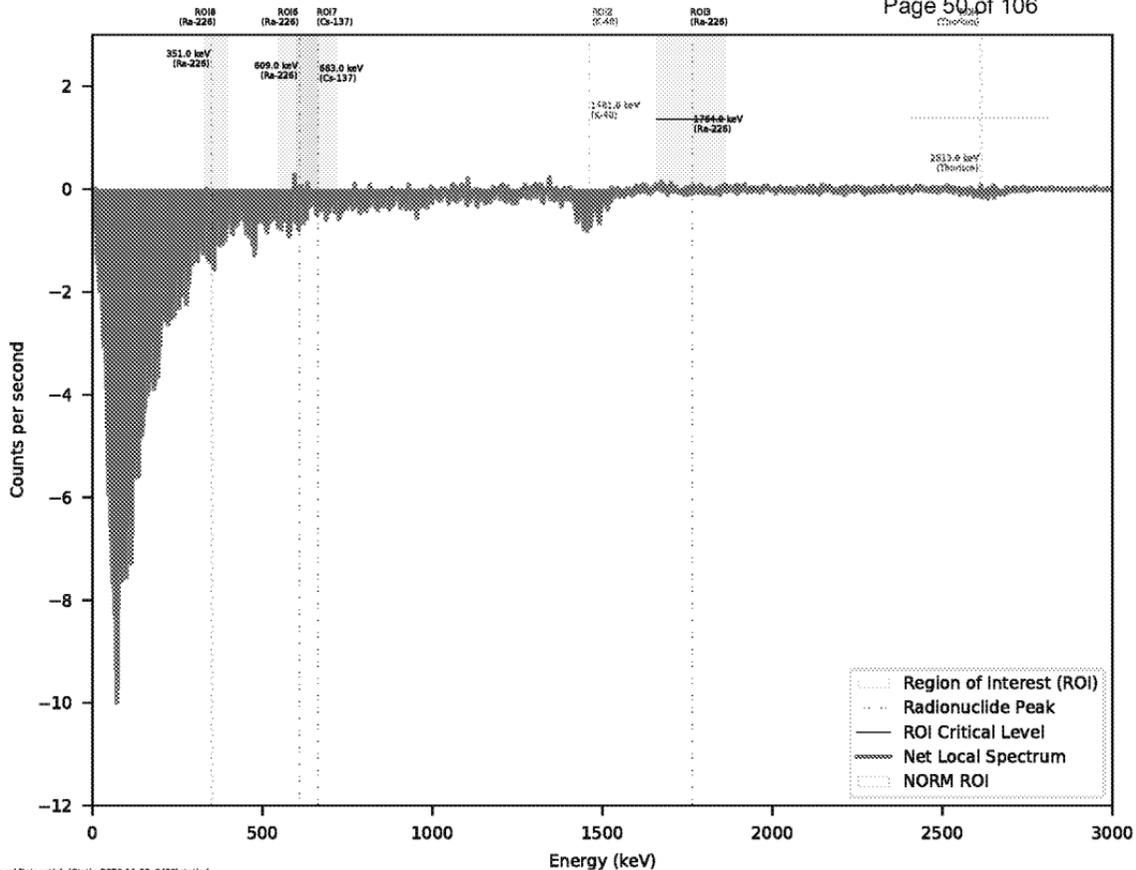


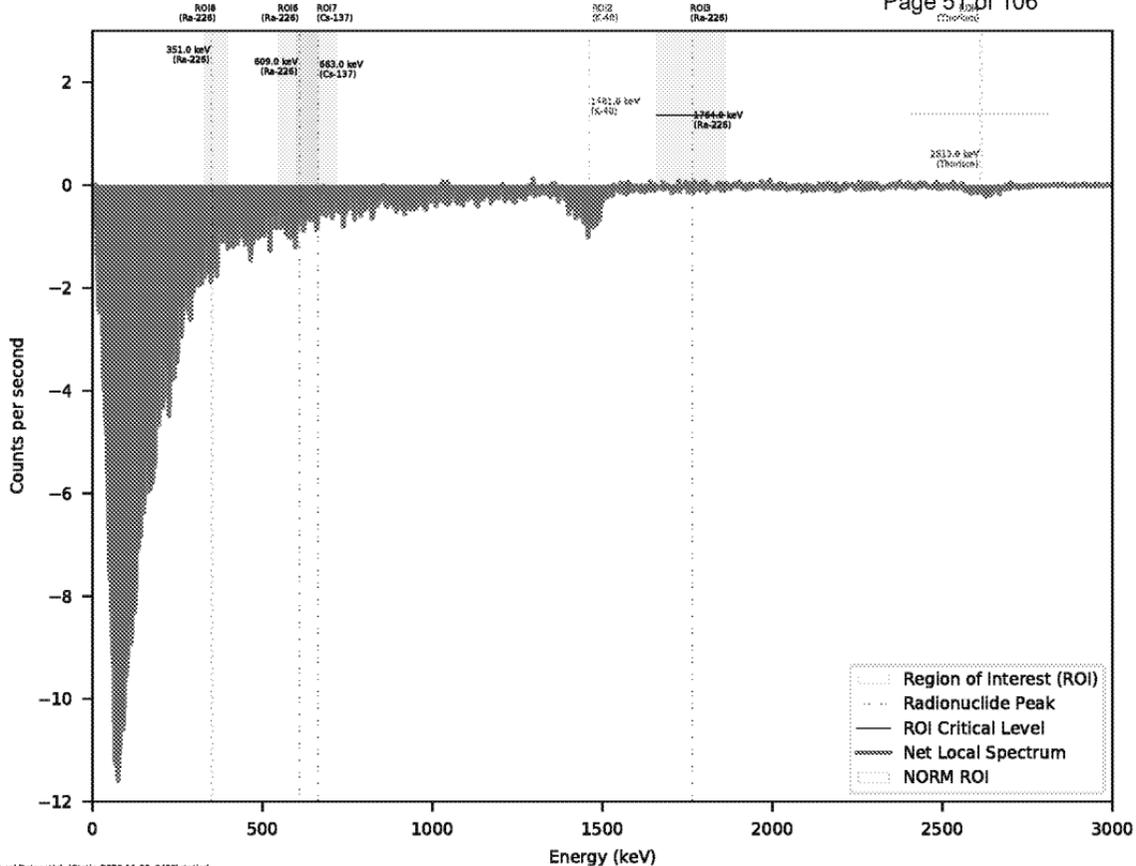


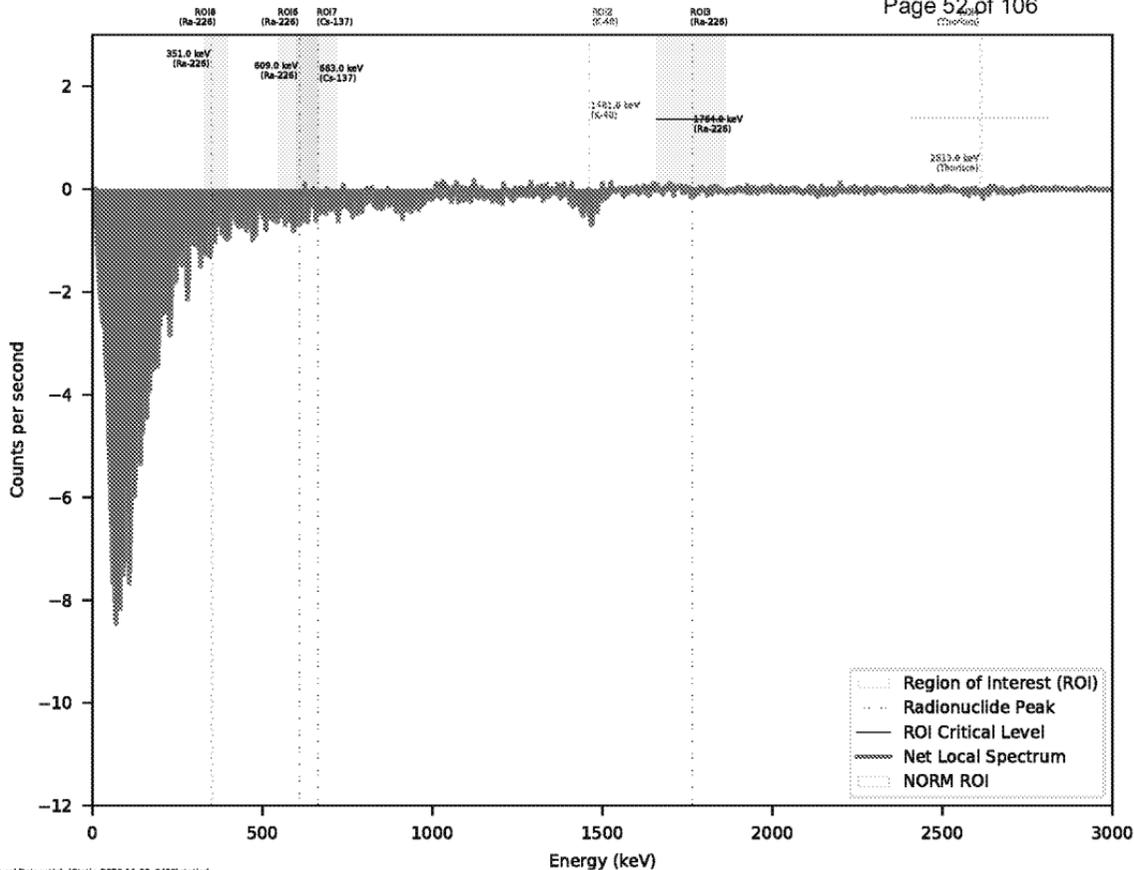
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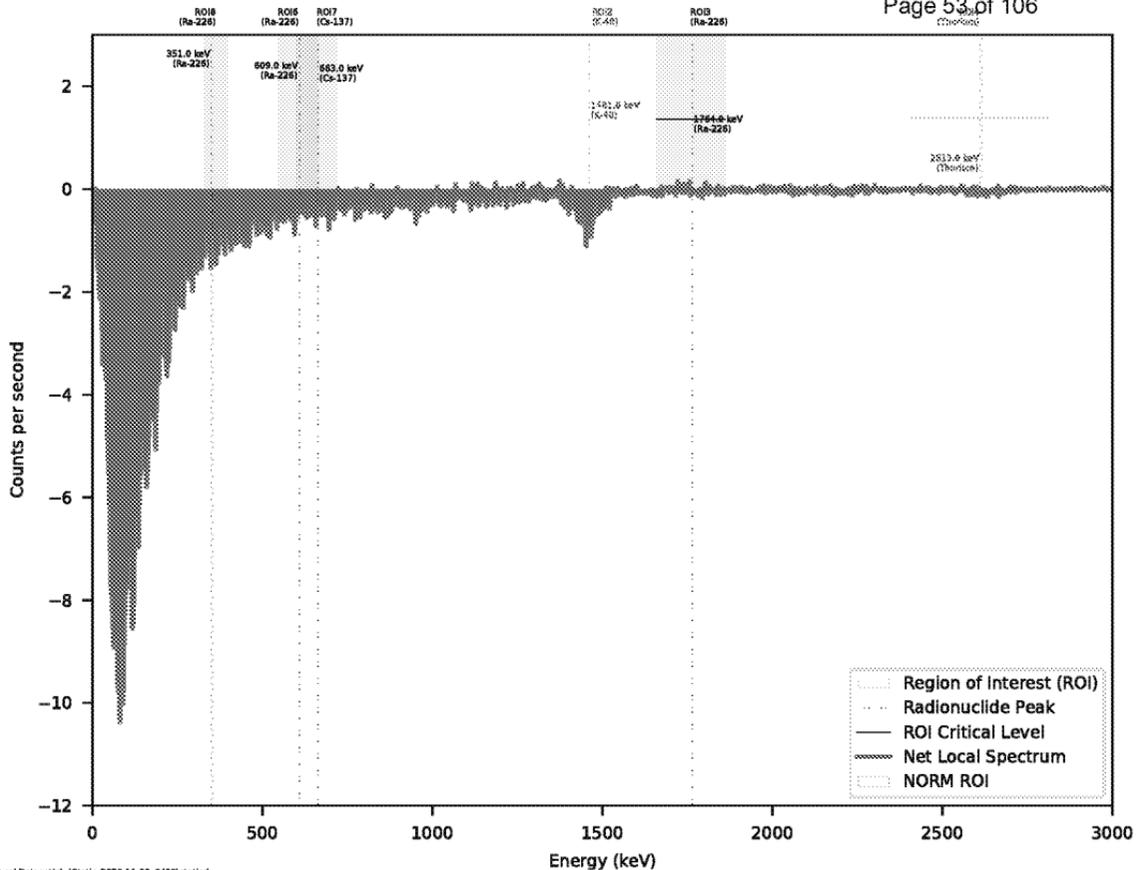


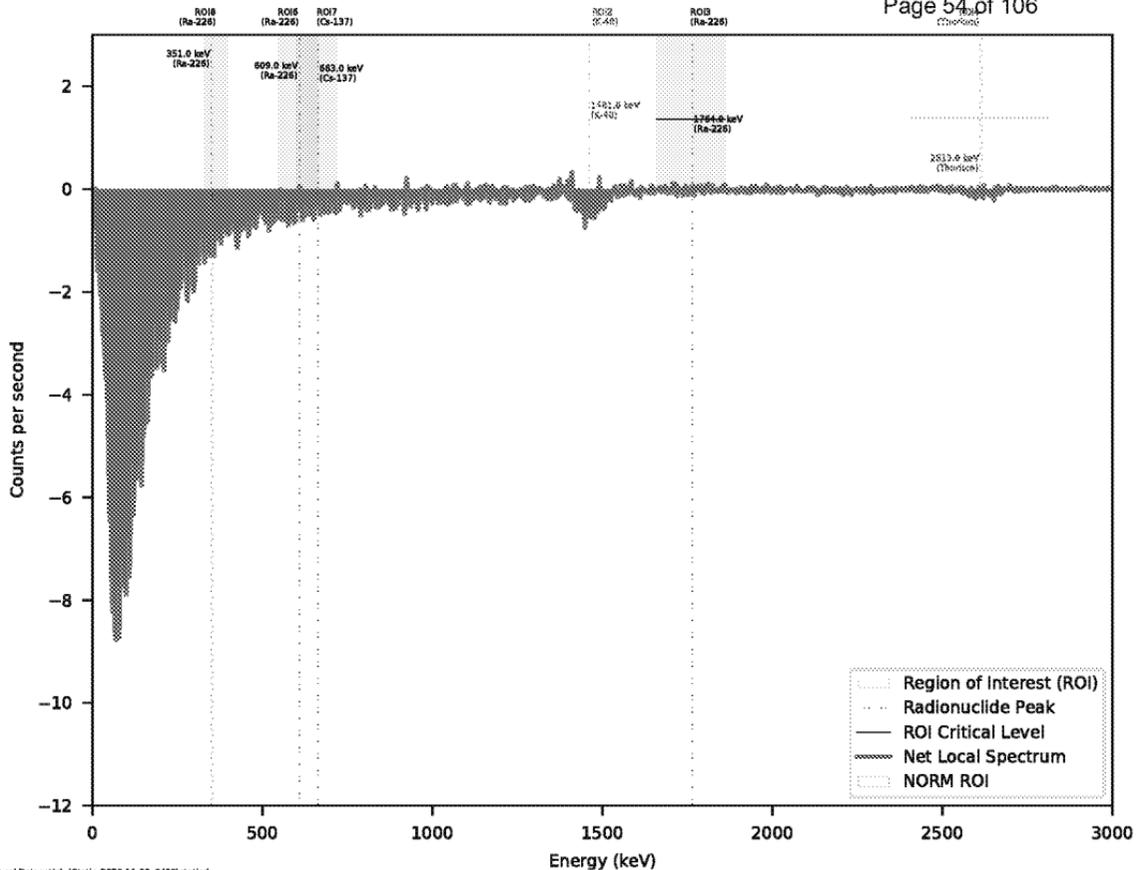


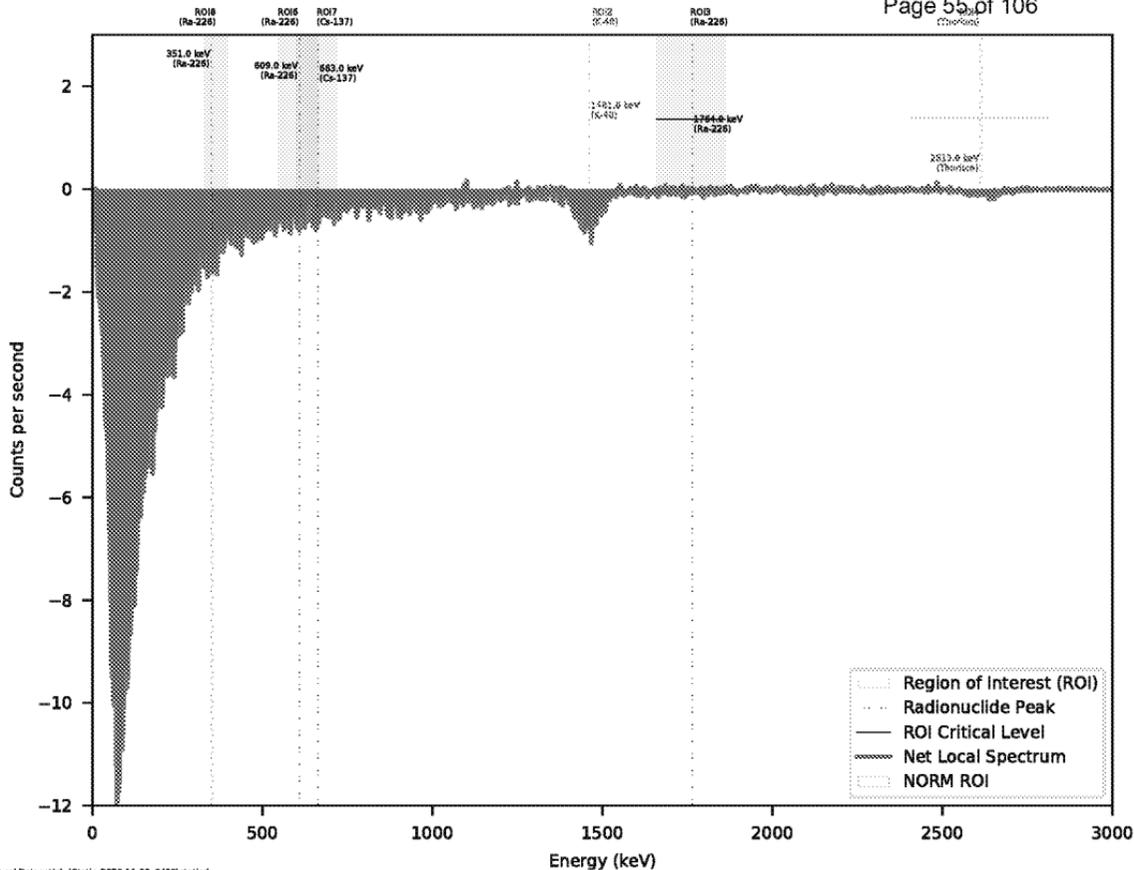














Environment Testing  
America

# ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40338-1  
Laboratory Sample Delivery Group: GJ46599776  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 2

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

Authorized for release by:  
4/9/2021 4:22:24 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

### LINKS

Review your project  
results through  
**Total Access**

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The  
Expert**

Visit us at:  
[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
SDG: GJ46599776

**Job ID: 160-40338-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

**Narrative**

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40338-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- MB z score failed for strontium 90 affecting sample HPPG-F-031 (160-40338-26). Sample was re-extracted with results reported in this revision.

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
SDG: GJ46599776

## Job ID: 160-40338-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Revision 2- Additional information requested in case narrative for total strontium

#### RECEIPT

The samples were received on 11/11/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 10.4 C.

#### STRONTIUM-90 (GFPC)

Samples HPPG-ESU-TU108A-001 (160-40338-1), HPPG-ESU-TU108A-011 (160-40338-11), HPPG-ESU-TU108A-021 (160-40338-21) and HPPG-F-031 (160-40338-26) were analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/13/2020, prepared on 11/30/2020 and analyzed on 12/09/2020.

Strontium-90 prep batch 490555

The method blank (MB) z-score associated with Prep Batch 160-490555 is within limits and is stored in the level IV raw data. (MB 160-490555/21-A)

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU108A-001 (160-40338-1), HPPG-ESU-TU108A-011 (160-40338-11) and HPPG-ESU-TU108A-021 (160-40338-21).

Strontium-90 prep batch 492111

The method blank (MB) z-score associated with Prep Batch 160-492111 is within limits and is stored in the level IV raw data. (MB 160-492111/22-A)

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-F-031 (160-40338-26).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU108A-001 (160-40338-1), HPPG-ESU-TU108A-002 (160-40338-2), HPPG-ESU-TU108A-003 (160-40338-3), HPPG-ESU-TU108A-004 (160-40338-4), HPPG-ESU-TU108A-005 (160-40338-5), HPPG-ESU-TU108A-006 (160-40338-6), HPPG-ESU-TU108A-007 (160-40338-7), HPPG-ESU-TU108A-008 (160-40338-8), HPPG-ESU-TU108A-009 (160-40338-9), HPPG-ESU-TU108A-010 (160-40338-10), HPPG-ESU-TU108A-011 (160-40338-11), HPPG-ESU-TU108A-012 (160-40338-12), HPPG-ESU-TU108A-013 (160-40338-13), HPPG-ESU-TU108A-014 (160-40338-14), HPPG-ESU-TU108A-015 (160-40338-15), HPPG-ESU-TU108A-016 (160-40338-16), HPPG-ESU-TU108A-017 (160-40338-17), HPPG-ESU-TU108A-018 (160-40338-18), HPPG-ESU-TU108A-019 (160-40338-19), HPPG-ESU-TU108A-020 (160-40338-20), HPPG-ESU-TU108A-021 (160-40338-21), HPPG-ESU-TU108A-022 (160-40338-22), HPPG-ESU-TU108A-023 (160-40338-23), HPPG-ESU-TU108A-024 (160-40338-24), HPPG-ESU-TU108A-025 (160-40338-25), HPPG-F-031 (160-40338-26) and HPPG-F-032 (160-40338-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 11/13/2020, prepared on 11/18/2020 and 11/20/2020 and analyzed on 12/09/2020, 12/10/2020 and 12/11/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
SDG: GJ46599776

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## Job ID: 160-40338-1 (Continued)

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### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

#### Gamma prep batch 489844

The MB z-score for Th-234/U-238 associated with Prep Batch 160-489844 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489844/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU108A-025 (160-40338-25)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Th-234: (MB 160-489844/1-A). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

#### Gamma prep batch 489475

The MB z-score for Ac-228/Ra-228/Th-232 associated with Prep Batch 160-489475 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489475/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU108A-001 (160-40338-1), HPPG-ESU-TU108A-006 (160-40338-6), HPPG-ESU-TU108A-015 (160-40338-15) and HPPG-ESU-TU108A-016 (160-40338-16)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-029

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

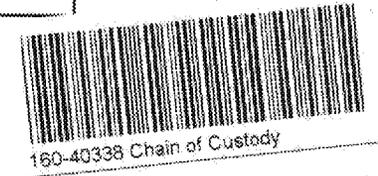
Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Murri, Andrew

Sample Tech(s): Paul Leblanc  
Joaquin Ramirez

Project Number: 501197  
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
Project Location: San Francisco, CA  
Purchase Order #: 1159058  
Shipment/Pickup Date: 11/10/2020  
Waybill Number: 4190219225 69854  
Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046  
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

		Analysis Requested										Dose Rate uR/Hr	Evidence Bag ID	Comment
Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)								
SO	1	16 oz. plastic jar			X	X						5	GJ46599776	
SO	1	16 oz. plastic jar			X							5	GJ46599776	
SO	1	16 oz. plastic jar			X							5	GJ46599776	
SO	1	16 oz. plastic jar			X							5	GJ46599776	
SO	1	16 oz. plastic jar			X							5	GJ46599776	
SO	1	16 oz. plastic jar			X							5	GJ46599776	
SO	1	16 oz. plastic jar			X							5	GJ46599776	
SO	1	16 oz. plastic jar			X							5	GJ46599776	



Sample ID	Collection Information			Matrix	# of Containers	Container Type
	Date	Time	Method			
HPPG-ESU-TU108A-001	11/9/2020	13:30	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU108A-002	11/9/2020	13:33	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU108A-003	11/9/2020	13:35	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU108A-004	11/9/2020	13:37	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU108A-005	11/9/2020	13:39	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU108A-006	11/9/2020	13:45	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU108A-007	11/9/2020	13:49	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU108A-008	11/9/2020	13:53	G	SO	1	16 oz. plastic jar

**Special Instructions:** Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

21 day ingrowth results only

Turanaround Time: 3-day  10-Day  28-day  Other  Level of QC Required: I  II  III  Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew	<i>[Signature]</i>	11/09/2020 17:23	Locked Storage (RKillpack)	<i>[Signature]</i>	11/09/2020 17:23
Locked Storage (RKillpack)	<i>[Signature]</i>	11/10/2020 13:00	Andrew Murri	<i>[Signature]</i>	11/10/2020 13:00
Andrew Murri	<i>[Signature]</i>	11/10/2020 13:23	SHIPPED TO LAB via FedEx	<i>[Signature]</i>	11/10/2020 09:05

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*

Page 6 of 35

4/9/2021 (Rev. 2)



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-029

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Murri, Andrew

Sample Tech(s): Paul Leblanc  
Joaquin Ramirez

Project Number: 501197  
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
Project Location: San Francisco, CA  
Purchase Order #: 1159058  
Shipment/Pickup Date: 11/10/2020  
Waybill Number: 4957 0225 6854  
Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested					Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)						
HPPG-ESU-TU108A-009	11/9/2020	13:56	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-010	11/9/2020	13:59	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-011	11/9/2020	14:03	G	SO	1	16 oz. plastic jar	X	X				5	GJ46599776	
HPPG-ESU-TU108A-012	11/9/2020	14:05	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-013	11/9/2020	14:07	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-014	11/9/2020	14:10	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-015	11/9/2020	14:14	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-016	11/9/2020	14:16	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-017	11/9/2020	14:18	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-018	11/9/2020	14:19	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-019	11/9/2020	14:22	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-020	11/9/2020	14:23	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-021	11/9/2020	14:25	G	SO	1	16 oz. plastic jar	X	X				5	GJ46599776	
HPPG-ESU-TU108A-022	11/9/2020	14:26	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-023	11/9/2020	14:28	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-024	11/9/2020	14:33	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	
HPPG-ESU-TU108A-025	11/9/2020	14:35	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-029

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Murri, Andrew

Sample Tech(s): Paul Leblanc  
Joaquin Ramirez

Project Number: 501197  
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
Project Location: San Francisco, CA  
Purchase Order #: 1159058  
Shipment/Pickup Date: 11/10/2020  
Waybill Number: 445F 0225 05804  
Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046  
Lab Contact Name/ph #: Rhoeda Ridenbuer (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested					Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)						
HPPG-F-031	11/9/2020	13:30	G	SO	1	16 oz. plastic jar	X	X				5	GJ46599776	
HPPG-F-032	11/9/2020	13:59	G	SO	1	16 oz. plastic jar	X					5	GJ46599776	



# All Transfers for COC 501197RSY-029

Page 4 of 4

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew	<i>[Signature]</i>	11/09/2020 17:23	Locked Storage (RKillpack)	<i>[Signature]</i>	11/09/2020 17:23
Locked Storage (RKillpack)	<i>[Signature]</i>	11/10/2020 13:00	Andrew Murri	<i>[Signature]</i>	11/10/2020 13:00
Andrew Murri	<i>[Signature]</i>	11/10/2020 13:23	SHIPPED TO LAB via FedEx	<i>[Signature]</i>	11/11/2020 09:05



## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40338-1

SDG Number: GJ46599776

**Login Number: 40338****List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

## Qualifiers

### Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
SDG: GJ46599776

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

**Protocol References:**

- DOE = U.S. Department of Energy
- EPA = US Environmental Protection Agency
- None = None

**Laboratory References:**

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Sample Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
SDG: GJ46599776

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40338-1	HPPG-ESU-TU108A-001	Solid	11/09/20 13:30	11/11/20 09:05	
160-40338-2	HPPG-ESU-TU108A-002	Solid	11/09/20 13:33	11/11/20 09:05	
160-40338-3	HPPG-ESU-TU108A-003	Solid	11/09/20 13:35	11/11/20 09:05	
160-40338-4	HPPG-ESU-TU108A-004	Solid	11/09/20 13:37	11/11/20 09:05	
160-40338-5	HPPG-ESU-TU108A-005	Solid	11/09/20 13:39	11/11/20 09:05	
160-40338-6	HPPG-ESU-TU108A-006	Solid	11/09/20 13:45	11/11/20 09:05	
160-40338-7	HPPG-ESU-TU108A-007	Solid	11/09/20 13:49	11/11/20 09:05	
160-40338-8	HPPG-ESU-TU108A-008	Solid	11/09/20 13:53	11/11/20 09:05	
160-40338-9	HPPG-ESU-TU108A-009	Solid	11/09/20 13:56	11/11/20 09:05	
160-40338-10	HPPG-ESU-TU108A-010	Solid	11/09/20 13:59	11/11/20 09:05	
160-40338-11	HPPG-ESU-TU108A-011	Solid	11/09/20 14:03	11/11/20 09:05	
160-40338-12	HPPG-ESU-TU108A-012	Solid	11/09/20 14:05	11/11/20 09:05	
160-40338-13	HPPG-ESU-TU108A-013	Solid	11/09/20 14:07	11/11/20 09:05	
160-40338-14	HPPG-ESU-TU108A-014	Solid	11/09/20 14:10	11/11/20 09:05	
160-40338-15	HPPG-ESU-TU108A-015	Solid	11/09/20 14:14	11/11/20 09:05	
160-40338-16	HPPG-ESU-TU108A-016	Solid	11/09/20 14:16	11/11/20 09:05	
160-40338-17	HPPG-ESU-TU108A-017	Solid	11/09/20 14:18	11/11/20 09:05	
160-40338-18	HPPG-ESU-TU108A-018	Solid	11/09/20 14:19	11/11/20 09:05	
160-40338-19	HPPG-ESU-TU108A-019	Solid	11/09/20 14:22	11/11/20 09:05	
160-40338-20	HPPG-ESU-TU108A-020	Solid	11/09/20 14:23	11/11/20 09:05	
160-40338-21	HPPG-ESU-TU108A-021	Solid	11/09/20 14:25	11/11/20 09:05	
160-40338-22	HPPG-ESU-TU108A-022	Solid	11/09/20 14:26	11/11/20 09:05	
160-40338-23	HPPG-ESU-TU108A-023	Solid	11/09/20 14:28	11/11/20 09:05	
160-40338-24	HPPG-ESU-TU108A-024	Solid	11/09/20 14:33	11/11/20 09:05	
160-40338-25	HPPG-ESU-TU108A-025	Solid	11/09/20 14:35	11/11/20 09:05	
160-40338-26	HPPG-F-031	Solid	11/09/20 13:30	11/11/20 09:05	
160-40338-27	HPPG-F-032	Solid	11/09/20 13:59	11/11/20 09:05	

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-001**

**Lab Sample ID: 160-40338-1**

Date Collected: 11/09/20 13:30

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	0.0219	U	0.163	0.163	0.331	0.133	pCi/g	11/30/20 10:34	12/09/20 17:58	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	105		40 - 110					11/30/20 10:34	12/09/20 17:58	1
Y Carrier	91.6		40 - 110					11/30/20 10:34	12/09/20 17:58	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.506		0.204	0.210		0.123	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Actinium-227	0.623		0.504	0.509		0.272	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Bismuth-212	-0.00431	U	0.542	0.542		0.704	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Bismuth-214	0.484		0.172	0.179		0.0807	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Cesium-137	-0.0669	U	0.0428	0.0434	0.0700	0.0824	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Lead-210	-0.363	U	1.48	1.49		1.07	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Lead-212	0.400		0.0947	0.108		0.0440	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Lead-214	0.349		0.117	0.123		0.0698	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Potassium-40	7.98		1.70	1.89		0.467	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Protactinium-231	-0.908	U	2.79	2.79		2.26	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Protactinium-234	-0.0933	U	0.241	0.241		0.194	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Radium-226	0.484		0.172	0.179	0.200	0.0807	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Radium-228	0.506		0.204	0.210		0.123	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Thallium-208	0.258		0.0903	0.0942		0.0329	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Thorium 228	0.400		0.0947	0.108		0.0440	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Thorium-232	0.506		0.204	0.210		0.123	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Thorium-234	0.276	U	0.447	0.448		0.365	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Uranium-235	-0.172	U	0.248	0.249		0.311	pCi/g	11/18/20 18:51	12/10/20 16:51	1
Uranium-238	0.276	U	0.447	0.448		0.365	pCi/g	11/18/20 18:51	12/10/20 16:51	1

**Client Sample ID: HPPG-ESU-TU108A-002**

**Lab Sample ID: 160-40338-2**

Date Collected: 11/09/20 13:33

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.472		0.144	0.152		0.0256	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Actinium-227	-0.109	U	0.559	0.559		0.344	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Bismuth-212	0.0636	U	0.624	0.624		0.508	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Bismuth-214	0.309		0.118	0.122		0.0493	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Cesium-137	-0.0201	U	0.0613	0.0613	0.0700	0.0489	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Lead-210	-0.931	U	1.44	1.44		1.22	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Lead-212	0.274		0.0778	0.0855		0.0445	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Lead-214	0.191		0.0959	0.0980		0.0868	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Potassium-40	7.10		1.14	1.35		0.238	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Protactinium-231	0.297	U	1.19	1.19		1.83	pCi/g	11/18/20 18:51	12/09/20 09:44	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-002**

**Lab Sample ID: 160-40338-2**

Date Collected: 11/09/20 13:33

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.102	U	0.188	0.188		0.200	pCi/g	11/18/20 18:51	12/09/20 09:44	1
<b>Radium-226</b>	<b>0.309</b>		0.118	0.122	0.200	0.0493	pCi/g	11/18/20 18:51	12/09/20 09:44	1
<b>Radium-228</b>	<b>0.472</b>		0.144	0.152		0.0256	pCi/g	11/18/20 18:51	12/09/20 09:44	1
<b>Thallium-208</b>	<b>0.160</b>		0.0516	0.0542		0.0183	pCi/g	11/18/20 18:51	12/09/20 09:44	1
<b>Thorium 228</b>	<b>0.274</b>		0.0778	0.0855		0.0445	pCi/g	11/18/20 18:51	12/09/20 09:44	1
<b>Thorium-232</b>	<b>0.472</b>		0.144	0.152		0.0256	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Thorium-234	0.0444	U	0.0621	0.0623		0.687	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Uranium-235	0.156	U	0.356	0.356		0.379	pCi/g	11/18/20 18:51	12/09/20 09:44	1
Uranium-238	0.0444	U	0.0621	0.0623		0.687	pCi/g	11/18/20 18:51	12/09/20 09:44	1

**Client Sample ID: HPPG-ESU-TU108A-003**

**Lab Sample ID: 160-40338-3**

Date Collected: 11/09/20 13:35

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.212</b>		0.263	0.264		0.162	pCi/g	11/18/20 18:51	12/09/20 09:43	1
Actinium-227	0.287	U	0.579	0.580		0.346	pCi/g	11/18/20 18:51	12/09/20 09:43	1
Bismuth-212	0.0756	U	1.13	1.13		0.925	pCi/g	11/18/20 18:51	12/09/20 09:43	1
<b>Bismuth-214</b>	<b>0.511</b>		0.181	0.190		0.0751	pCi/g	11/18/20 18:51	12/09/20 09:43	1
Cesium-137	0.0328	U	0.0812	0.0813	0.0700	0.0640	pCi/g	11/18/20 18:51	12/09/20 09:43	1
<b>Lead-210</b>	<b>2.21</b>		1.69	1.71		0.917	pCi/g	11/18/20 18:51	12/09/20 09:43	1
<b>Lead-212</b>	<b>0.514</b>		0.110	0.125		0.0543	pCi/g	11/18/20 18:51	12/09/20 09:43	1
<b>Lead-214</b>	<b>0.529</b>		0.153	0.164		0.0669	pCi/g	11/18/20 18:51	12/09/20 09:43	1
<b>Potassium-40</b>	<b>9.97</b>		1.61	1.97		0.321	pCi/g	11/18/20 18:51	12/09/20 09:43	1
Protactinium-231	0.420	U	2.60	2.60		2.13	pCi/g	11/18/20 18:51	12/09/20 09:43	1
Protactinium-234	0.225	U	0.122	0.125		0.313	pCi/g	11/18/20 18:51	12/09/20 09:43	1
<b>Radium-226</b>	<b>0.511</b>		0.181	0.190	0.200	0.0751	pCi/g	11/18/20 18:51	12/09/20 09:43	1
<b>Radium-228</b>	<b>0.212</b>		0.263	0.264		0.162	pCi/g	11/18/20 18:51	12/09/20 09:43	1
<b>Thallium-208</b>	<b>0.166</b>		0.0722	0.0747		0.0319	pCi/g	11/18/20 18:51	12/09/20 09:43	1
<b>Thorium 228</b>	<b>0.514</b>		0.110	0.125		0.0543	pCi/g	11/18/20 18:51	12/09/20 09:43	1
<b>Thorium-232</b>	<b>0.212</b>		0.263	0.264		0.162	pCi/g	11/18/20 18:51	12/09/20 09:43	1
Thorium-234	0.208	U	0.325	0.326		0.941	pCi/g	11/18/20 18:51	12/09/20 09:43	1
Uranium-235	0.124	U	0.262	0.262		0.485	pCi/g	11/18/20 18:51	12/09/20 09:43	1
Uranium-238	0.208	U	0.325	0.326		0.941	pCi/g	11/18/20 18:51	12/09/20 09:43	1

**Client Sample ID: HPPG-ESU-TU108A-004**

**Lab Sample ID: 160-40338-4**

Date Collected: 11/09/20 13:37

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.222</b>		0.122	0.125		0.182	pCi/g	11/18/20 18:51	12/09/20 09:45	1
Actinium-227	0.213	U	0.463	0.463		0.274	pCi/g	11/18/20 18:51	12/09/20 09:45	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-004**

**Lab Sample ID: 160-40338-4**

Date Collected: 11/09/20 13:37

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	0.0474	U	0.750	0.750		0.611	pCi/g	11/18/20 18:51	12/09/20 09:45	1
<b>Bismuth-214</b>	<b>0.267</b>		0.132	0.135		0.0733	pCi/g	11/18/20 18:51	12/09/20 09:45	1
Cesium-137	-0.0346	U	0.0488	0.0489	0.0700	0.0606	pCi/g	11/18/20 18:51	12/09/20 09:45	1
Lead-210	0.738	U	1.23	1.24		0.840	pCi/g	11/18/20 18:51	12/09/20 09:45	1
<b>Lead-212</b>	<b>0.321</b>		0.0857	0.0952		0.0432	pCi/g	11/18/20 18:51	12/09/20 09:45	1
<b>Lead-214</b>	<b>0.404</b>		0.109	0.117		0.0633	pCi/g	11/18/20 18:51	12/09/20 09:45	1
<b>Potassium-40</b>	<b>8.31</b>		1.51	1.73		0.257	pCi/g	11/18/20 18:51	12/09/20 09:45	1
Protactinium-231	0.377	U	1.66	1.66		1.98	pCi/g	11/18/20 18:51	12/09/20 09:45	1
<b>Protactinium-234</b>	<b>0.239</b>		0.158	0.160		0.146	pCi/g	11/18/20 18:51	12/09/20 09:45	1
<b>Radium-226</b>	<b>0.267</b>		0.132	0.135	0.200	0.0733	pCi/g	11/18/20 18:51	12/09/20 09:45	1
<b>Radium-228</b>	<b>0.222</b>		0.122	0.125		0.182	pCi/g	11/18/20 18:51	12/09/20 09:45	1
<b>Thallium-208</b>	<b>0.0549</b>		0.0904	0.0906		0.0383	pCi/g	11/18/20 18:51	12/09/20 09:45	1
<b>Thorium 228</b>	<b>0.321</b>		0.0857	0.0952		0.0432	pCi/g	11/18/20 18:51	12/09/20 09:45	1
<b>Thorium-232</b>	<b>0.222</b>		0.122	0.125		0.182	pCi/g	11/18/20 18:51	12/09/20 09:45	1
Thorium-234	-0.689	U	0.475	0.481		0.723	pCi/g	11/18/20 18:51	12/09/20 09:45	1
Uranium-235	-0.0318	U	0.255	0.255		0.295	pCi/g	11/18/20 18:51	12/09/20 09:45	1
Uranium-238	-0.689	U	0.475	0.481		0.723	pCi/g	11/18/20 18:51	12/09/20 09:45	1

**Client Sample ID: HPPG-ESU-TU108A-005**

**Lab Sample ID: 160-40338-5**

Date Collected: 11/09/20 13:39

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.610</b>		0.214	0.223		0.0767	pCi/g	11/18/20 18:51	12/09/20 10:20	1
Actinium-227	0.122	U	0.295	0.296		0.337	pCi/g	11/18/20 18:51	12/09/20 10:20	1
Bismuth-212	0.000	U	0.474	0.474		0.558	pCi/g	11/18/20 18:51	12/09/20 10:20	1
Bismuth-214	0.124	U	0.0813	0.0823		0.165	pCi/g	11/18/20 18:51	12/09/20 10:20	1
Cesium-137	-0.0114	U	0.0646	0.0646	0.0700	0.0524	pCi/g	11/18/20 18:51	12/09/20 10:20	1
Lead-210	-0.423	U	1.69	1.69		1.40	pCi/g	11/18/20 18:51	12/09/20 10:20	1
<b>Lead-212</b>	<b>0.485</b>		0.0858	0.106		0.0367	pCi/g	11/18/20 18:51	12/09/20 10:20	1
<b>Lead-214</b>	<b>0.444</b>		0.118	0.127		0.0469	pCi/g	11/18/20 18:51	12/09/20 10:20	1
<b>Potassium-40</b>	<b>9.32</b>		1.29	1.60		0.233	pCi/g	11/18/20 18:51	12/09/20 10:20	1
Protactinium-231	-0.722	U	2.57	2.57		2.09	pCi/g	11/18/20 18:51	12/09/20 10:20	1
Protactinium-234	0.0241	U	0.0459	0.0460		0.253	pCi/g	11/18/20 18:51	12/09/20 10:20	1
Radium-226	0.124	U	0.0813	0.0823	0.200	0.165	pCi/g	11/18/20 18:51	12/09/20 10:20	1
<b>Radium-228</b>	<b>0.610</b>		0.214	0.223		0.0767	pCi/g	11/18/20 18:51	12/09/20 10:20	1
<b>Thallium-208</b>	<b>0.157</b>		0.0442	0.0471		0.0132	pCi/g	11/18/20 18:51	12/09/20 10:20	1
<b>Thorium 228</b>	<b>0.485</b>		0.0858	0.106		0.0367	pCi/g	11/18/20 18:51	12/09/20 10:20	1
<b>Thorium-232</b>	<b>0.610</b>		0.214	0.223		0.0767	pCi/g	11/18/20 18:51	12/09/20 10:20	1
<b>Thorium-234</b>	<b>0.757</b>		0.602	0.607		0.391	pCi/g	11/18/20 18:51	12/09/20 10:20	1
Uranium-235	0.185	U	0.371	0.372		0.375	pCi/g	11/18/20 18:51	12/09/20 10:20	1
<b>Uranium-238</b>	<b>0.757</b>		0.602	0.607		0.391	pCi/g	11/18/20 18:51	12/09/20 10:20	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-006**

**Lab Sample ID: 160-40338-6**

Date Collected: 11/09/20 13:45

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.149	U	0.267	0.267		0.170	pCi/g	11/18/20 18:51	12/09/20 11:32	1
Actinium-227	0.105	U	0.422	0.422		0.369	pCi/g	11/18/20 18:51	12/09/20 11:32	1
Bismuth-212	0.000	U	0.466	0.466		0.543	pCi/g	11/18/20 18:51	12/09/20 11:32	1
<b>Bismuth-214</b>	<b>0.505</b>		0.151	0.162		0.0551	pCi/g	11/18/20 18:51	12/09/20 11:32	1
Cesium-137	-0.0255	U	0.0885	0.0885	0.0700	0.0710	pCi/g	11/18/20 18:51	12/09/20 11:32	1
<b>Lead-210</b>	<b>1.05</b>		1.34	1.35		0.941	pCi/g	11/18/20 18:51	12/09/20 11:32	1
<b>Lead-212</b>	<b>0.367</b>		0.102	0.111		0.0595	pCi/g	11/18/20 18:51	12/09/20 11:32	1
<b>Lead-214</b>	<b>0.359</b>		0.132	0.138		0.0709	pCi/g	11/18/20 18:51	12/09/20 11:32	1
<b>Potassium-40</b>	<b>6.85</b>		1.30	1.52		0.301	pCi/g	11/18/20 18:51	12/09/20 11:32	1
Protactinium-231	0.384	U	1.47	1.47		2.33	pCi/g	11/18/20 18:51	12/09/20 11:32	1
Protactinium-234	0.101	U	0.307	0.307		0.256	pCi/g	11/18/20 18:51	12/09/20 11:32	1
<b>Radium-226</b>	<b>0.505</b>		0.151	0.162	0.200	0.0551	pCi/g	11/18/20 18:51	12/09/20 11:32	1
Radium-228	0.149	U	0.267	0.267		0.170	pCi/g	11/18/20 18:51	12/09/20 11:32	1
<b>Thallium-208</b>	<b>0.169</b>		0.0539	0.0573		0.0169	pCi/g	11/18/20 18:51	12/09/20 11:32	1
<b>Thorium 228</b>	<b>0.367</b>		0.102	0.111		0.0595	pCi/g	11/18/20 18:51	12/09/20 11:32	1
Thorium-232	0.149	U	0.267	0.267		0.170	pCi/g	11/18/20 18:51	12/09/20 11:32	1
Thorium-234	-0.967	U	0.747	0.757		0.913	pCi/g	11/18/20 18:51	12/09/20 11:32	1
Uranium-235	0.0242	U	0.155	0.155		0.547	pCi/g	11/18/20 18:51	12/09/20 11:32	1
Uranium-238	-0.967	U	0.747	0.757		0.913	pCi/g	11/18/20 18:51	12/09/20 11:32	1

**Client Sample ID: HPPG-ESU-TU108A-007**

**Lab Sample ID: 160-40338-7**

Date Collected: 11/09/20 13:49

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.514</b>		0.184	0.192		0.0386	pCi/g	11/18/20 18:51	12/09/20 10:21	1
Actinium-227	-0.369	U	0.786	0.787		0.475	pCi/g	11/18/20 18:51	12/09/20 10:21	1
Bismuth-212	-0.329	U	0.771	0.772		0.675	pCi/g	11/18/20 18:51	12/09/20 10:21	1
<b>Bismuth-214</b>	<b>0.331</b>		0.156	0.160		0.0755	pCi/g	11/18/20 18:51	12/09/20 10:21	1
Cesium-137	0.0105	U	0.0622	0.0622	0.0700	0.0498	pCi/g	11/18/20 18:51	12/09/20 10:21	1
<b>Lead-210</b>	<b>0.804</b>		0.958	0.963		0.664	pCi/g	11/18/20 18:51	12/09/20 10:21	1
<b>Lead-212</b>	<b>0.397</b>		0.0878	0.102		0.0359	pCi/g	11/18/20 18:51	12/09/20 10:21	1
<b>Lead-214</b>	<b>0.259</b>		0.120	0.123		0.0834	pCi/g	11/18/20 18:51	12/09/20 10:21	1
<b>Potassium-40</b>	<b>8.99</b>		1.59	1.83		0.263	pCi/g	11/18/20 18:51	12/09/20 10:21	1
Protactinium-231	0.299	U	2.32	2.32		1.89	pCi/g	11/18/20 18:51	12/09/20 10:21	1
Protactinium-234	0.0492	U	0.107	0.107		0.175	pCi/g	11/18/20 18:51	12/09/20 10:21	1
<b>Radium-226</b>	<b>0.331</b>		0.156	0.160	0.200	0.0755	pCi/g	11/18/20 18:51	12/09/20 10:21	1
<b>Radium-228</b>	<b>0.514</b>		0.184	0.192		0.0386	pCi/g	11/18/20 18:51	12/09/20 10:21	1
<b>Thallium-208</b>	<b>0.201</b>		0.0742	0.0771		0.0277	pCi/g	11/18/20 18:51	12/09/20 10:21	1
<b>Thorium 228</b>	<b>0.397</b>		0.0878	0.102		0.0359	pCi/g	11/18/20 18:51	12/09/20 10:21	1
<b>Thorium-232</b>	<b>0.514</b>		0.184	0.192		0.0386	pCi/g	11/18/20 18:51	12/09/20 10:21	1
Thorium-234	-0.0829	U	0.844	0.844		0.697	pCi/g	11/18/20 18:51	12/09/20 10:21	1
Uranium-235	0.0908	U	0.278	0.278		0.224	pCi/g	11/18/20 18:51	12/09/20 10:21	1
Uranium-238	-0.0829	U	0.844	0.844		0.697	pCi/g	11/18/20 18:51	12/09/20 10:21	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-008**

**Lab Sample ID: 160-40338-8**

Date Collected: 11/09/20 13:53

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.788</b>		0.232	0.245		0.0827	pCi/g	11/18/20 18:51	12/09/20 11:16	1
Actinium-227	0.271	U	0.463	0.464		0.317	pCi/g	11/18/20 18:51	12/09/20 11:16	1
Bismuth-212	0.568	U	1.07	1.07		0.831	pCi/g	11/18/20 18:51	12/09/20 11:16	1
<b>Bismuth-214</b>	<b>0.497</b>		0.154	0.163		0.0601	pCi/g	11/18/20 18:51	12/09/20 11:16	1
Cesium-137	-0.00348	U	0.0721	0.0721	0.0700	0.0591	pCi/g	11/18/20 18:51	12/09/20 11:16	1
Lead-210	-0.670	U	1.71	1.71		1.43	pCi/g	11/18/20 18:51	12/09/20 11:16	1
<b>Lead-212</b>	<b>0.464</b>		0.0944	0.106		0.0437	pCi/g	11/18/20 18:51	12/09/20 11:16	1
<b>Lead-214</b>	<b>0.410</b>		0.123	0.130		0.0490	pCi/g	11/18/20 18:51	12/09/20 11:16	1
<b>Potassium-40</b>	<b>8.56</b>		1.53	1.76		0.228	pCi/g	11/18/20 18:51	12/09/20 11:16	1
Protactinium-231	0.378	U	1.40	1.40		2.23	pCi/g	11/18/20 18:51	12/09/20 11:16	1
Protactinium-234	-0.0212	U	0.0516	0.0516		0.238	pCi/g	11/18/20 18:51	12/09/20 11:16	1
<b>Radium-226</b>	<b>0.497</b>		0.154	0.163	0.200	0.0601	pCi/g	11/18/20 18:51	12/09/20 11:16	1
<b>Radium-228</b>	<b>0.788</b>		0.232	0.245		0.0827	pCi/g	11/18/20 18:51	12/09/20 11:16	1
<b>Thallium-208</b>	<b>0.135</b>		0.0783	0.0795		0.0366	pCi/g	11/18/20 18:51	12/09/20 11:16	1
<b>Thorium 228</b>	<b>0.464</b>		0.0944	0.106		0.0437	pCi/g	11/18/20 18:51	12/09/20 11:16	1
<b>Thorium-232</b>	<b>0.788</b>		0.232	0.245		0.0827	pCi/g	11/18/20 18:51	12/09/20 11:16	1
Thorium-234	0.334	U	0.471	0.472		0.422	pCi/g	11/18/20 18:51	12/09/20 11:16	1
Uranium-235	-0.00664	U	0.0536	0.0536		0.428	pCi/g	11/18/20 18:51	12/09/20 11:16	1
Uranium-238	0.334	U	0.471	0.472		0.422	pCi/g	11/18/20 18:51	12/09/20 11:16	1

**Client Sample ID: HPPG-ESU-TU108A-009**

**Lab Sample ID: 160-40338-9**

Date Collected: 11/09/20 13:56

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.468</b>		0.148	0.155		0.0272	pCi/g	11/18/20 18:51	12/09/20 11:27	1
Actinium-227	0.214	U	0.435	0.436		0.259	pCi/g	11/18/20 18:51	12/09/20 11:27	1
Bismuth-212	0.383	U	0.687	0.688		0.530	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Bismuth-214</b>	<b>0.484</b>		0.140	0.149		0.0540	pCi/g	11/18/20 18:51	12/09/20 11:27	1
Cesium-137	0.0264	U	0.0514	0.0515	0.0700	0.0396	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Lead-210</b>	<b>1.57</b>		1.37	1.39		0.855	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Lead-212</b>	<b>0.279</b>		0.0803	0.0880		0.0456	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Lead-214</b>	<b>0.375</b>		0.107	0.113		0.0651	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Potassium-40</b>	<b>8.42</b>		1.28	1.54		0.253	pCi/g	11/18/20 18:51	12/09/20 11:27	1
Protactinium-231	0.000	U	0.258	0.258		2.03	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Protactinium-234</b>	<b>0.252</b>		0.174	0.176		0.235	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Radium-226</b>	<b>0.484</b>		0.140	0.149	0.200	0.0540	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Radium-228</b>	<b>0.468</b>		0.148	0.155		0.0272	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Thallium-208</b>	<b>0.157</b>		0.0585	0.0607		0.0231	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Thorium 228</b>	<b>0.279</b>		0.0803	0.0880		0.0456	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Thorium-232</b>	<b>0.468</b>		0.148	0.155		0.0272	pCi/g	11/18/20 18:51	12/09/20 11:27	1
Thorium-234	0.215	U	0.566	0.566		0.451	pCi/g	11/18/20 18:51	12/09/20 11:27	1
<b>Uranium-235</b>	<b>0.239</b>		0.173	0.175		0.105	pCi/g	11/18/20 18:51	12/09/20 11:27	1
Uranium-238	0.215	U	0.566	0.566		0.451	pCi/g	11/18/20 18:51	12/09/20 11:27	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-010**

**Lab Sample ID: 160-40338-10**

Date Collected: 11/09/20 13:59

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.118</b>		0.229	0.229		0.116	pCi/g	11/18/20 18:51	12/09/20 12:30	1
Actinium-227	0.160	U	0.293	0.293		0.259	pCi/g	11/18/20 18:51	12/09/20 12:30	1
Bismuth-212	0.0263	U	0.588	0.588		0.481	pCi/g	11/18/20 18:51	12/09/20 12:30	1
<b>Bismuth-214</b>	<b>0.362</b>		0.102	0.108		0.0372	pCi/g	11/18/20 18:51	12/09/20 12:30	1
Cesium-137	0.00617	U	0.0485	0.0485	0.0700	0.0392	pCi/g	11/18/20 18:51	12/09/20 12:30	1
Lead-210	-0.201	U	1.35	1.35		1.11	pCi/g	11/18/20 18:51	12/09/20 12:30	1
<b>Lead-212</b>	<b>0.206</b>		0.0820	0.0862		0.0542	pCi/g	11/18/20 18:51	12/09/20 12:30	1
<b>Lead-214</b>	<b>0.321</b>		0.103	0.108		0.0479	pCi/g	11/18/20 18:51	12/09/20 12:30	1
<b>Potassium-40</b>	<b>7.20</b>		1.24	1.45		0.220	pCi/g	11/18/20 18:51	12/09/20 12:30	1
Protactinium-231	0.000	U	0.521	0.521		1.88	pCi/g	11/18/20 18:51	12/09/20 12:30	1
Protactinium-234	0.0837	U	0.225	0.225		0.182	pCi/g	11/18/20 18:51	12/09/20 12:30	1
<b>Radium-226</b>	<b>0.362</b>		0.102	0.108	0.200	0.0372	pCi/g	11/18/20 18:51	12/09/20 12:30	1
<b>Radium-228</b>	<b>0.118</b>		0.229	0.229		0.116	pCi/g	11/18/20 18:51	12/09/20 12:30	1
<b>Thallium-208</b>	<b>0.123</b>		0.0560	0.0575		0.0237	pCi/g	11/18/20 18:51	12/09/20 12:30	1
<b>Thorium 228</b>	<b>0.206</b>		0.0820	0.0862		0.0542	pCi/g	11/18/20 18:51	12/09/20 12:30	1
<b>Thorium-232</b>	<b>0.118</b>		0.229	0.229		0.116	pCi/g	11/18/20 18:51	12/09/20 12:30	1
Thorium-234	-0.494	U	0.481	0.484		0.846	pCi/g	11/18/20 18:51	12/09/20 12:30	1
Uranium-235	-0.00666	U	0.212	0.212		0.345	pCi/g	11/18/20 18:51	12/09/20 12:30	1
Uranium-238	-0.494	U	0.481	0.484		0.846	pCi/g	11/18/20 18:51	12/09/20 12:30	1

**Client Sample ID: HPPG-ESU-TU108A-011**

**Lab Sample ID: 160-40338-11**

Date Collected: 11/09/20 14:03

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Strontium-90	0.0638	U	0.152	0.152	0.331	0.120	pCi/g	11/30/20 10:34	12/09/20 17:59	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	103		40 - 110					11/30/20 10:34	12/09/20 17:59	1
Y Carrier	92.7		40 - 110					11/30/20 10:34	12/09/20 17:59	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.131</b>		0.240	0.241		0.125	pCi/g	11/18/20 18:51	12/09/20 12:04	1
<b>Actinium-227</b>	<b>0.351</b>		0.373	0.375		0.258	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Bismuth-212	-0.308	U	0.868	0.868		0.688	pCi/g	11/18/20 18:51	12/09/20 12:04	1
<b>Bismuth-214</b>	<b>0.366</b>		0.165	0.170		0.0677	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Cesium-137	0.0292	U	0.0731	0.0732	0.0700	0.0577	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Lead-210	0.516	U	1.38	1.39		0.959	pCi/g	11/18/20 18:51	12/09/20 12:04	1
<b>Lead-212</b>	<b>0.324</b>		0.0860	0.0941		0.0454	pCi/g	11/18/20 18:51	12/09/20 12:04	1
<b>Lead-214</b>	<b>0.364</b>		0.109	0.117		0.0645	pCi/g	11/18/20 18:51	12/09/20 12:04	1
<b>Potassium-40</b>	<b>6.98</b>		1.28	1.51		0.286	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Protactinium-231	0.341	U	1.41	1.41		2.20	pCi/g	11/18/20 18:51	12/09/20 12:04	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-011**

**Lab Sample ID: 160-40338-11**

Date Collected: 11/09/20 14:03

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.237		0.127	0.130		0.227	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Radium-226	0.366		0.165	0.170	0.200	0.0677	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Radium-228	0.131		0.240	0.241		0.125	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Thallium-208	0.0788		0.0710	0.0716		0.0368	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Thorium 228	0.324		0.0860	0.0941		0.0454	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Thorium-232	0.131		0.240	0.241		0.125	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Thorium-234	-0.885	U	0.513	0.524		0.811	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Uranium-235	-0.210	U	0.276	0.277		0.440	pCi/g	11/18/20 18:51	12/09/20 12:04	1
Uranium-238	-0.885	U	0.513	0.524		0.811	pCi/g	11/18/20 18:51	12/09/20 12:04	1

**Client Sample ID: HPPG-ESU-TU108A-012**

**Lab Sample ID: 160-40338-12**

Date Collected: 11/09/20 14:05

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.243		0.191	0.193		0.0799	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Actinium-227	0.109	U	0.362	0.363		0.288	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Bismuth-212	-0.00394	U	0.770	0.770		1.03	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Bismuth-214	0.263		0.133	0.136		0.0726	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Cesium-137	-0.0612	U	0.0348	0.0353	0.0700	0.0624	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Lead-210	0.564	U	0.939	0.942		0.622	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Lead-212	0.253		0.0709	0.0781		0.0317	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Lead-214	0.203		0.0858	0.0883		0.0608	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Potassium-40	6.49		1.33	1.48		0.252	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Protactinium-231	0.413	U	2.05	2.05		1.67	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Protactinium-234	0.108		0.219	0.219		0.0855	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Radium-226	0.263		0.133	0.136	0.200	0.0726	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Radium-228	0.243		0.191	0.193		0.0799	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Thallium-208	0.0874		0.0497	0.0505		0.0224	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Thorium 228	0.253		0.0709	0.0781		0.0317	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Thorium-232	0.243		0.191	0.193		0.0799	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Thorium-234	0.303		0.496	0.497		0.287	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Uranium-235	0.108	U	0.221	0.221		0.220	pCi/g	11/18/20 18:51	12/09/20 11:15	1
Uranium-238	0.303		0.496	0.497		0.287	pCi/g	11/18/20 18:51	12/09/20 11:15	1

**Client Sample ID: HPPG-ESU-TU108A-013**

**Lab Sample ID: 160-40338-13**

Date Collected: 11/09/20 14:07

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.259		0.216	0.218		0.0988	pCi/g	11/18/20 18:51	12/09/20 11:48	1
Actinium-227	0.111	U	0.290	0.291		0.285	pCi/g	11/18/20 18:51	12/09/20 11:48	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-013**

**Lab Sample ID: 160-40338-13**

Date Collected: 11/09/20 14:07

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	0.437	U	0.749	0.751		0.573	pCi/g	11/18/20 18:51	12/09/20 11:48	1
<b>Bismuth-214</b>	<b>0.420</b>		0.133	0.140		0.0479	pCi/g	11/18/20 18:51	12/09/20 11:48	1
Cesium-137	-0.000953	U	0.0688	0.0688	0.0700	0.0566	pCi/g	11/18/20 18:51	12/09/20 11:48	1
Lead-210	0.263	U	1.37	1.37		0.895	pCi/g	11/18/20 18:51	12/09/20 11:48	1
<b>Lead-212</b>	<b>0.282</b>		0.0858	0.0907		0.0413	pCi/g	11/18/20 18:51	12/09/20 11:48	1
<b>Lead-214</b>	<b>0.207</b>		0.126	0.127		0.0896	pCi/g	11/18/20 18:51	12/09/20 11:48	1
<b>Potassium-40</b>	<b>6.29</b>		1.49	1.62		0.477	pCi/g	11/18/20 18:51	12/09/20 11:48	1
Protactinium-231	-0.673	U	2.10	2.10		1.70	pCi/g	11/18/20 18:51	12/09/20 11:48	1
Protactinium-234	-0.0243	U	0.0754	0.0755		0.193	pCi/g	11/18/20 18:51	12/09/20 11:48	1
<b>Radium-226</b>	<b>0.420</b>		0.133	0.140	0.200	0.0479	pCi/g	11/18/20 18:51	12/09/20 11:48	1
<b>Radium-228</b>	<b>0.259</b>		0.216	0.218		0.0988	pCi/g	11/18/20 18:51	12/09/20 11:48	1
<b>Thallium-208</b>	<b>0.130</b>		0.0410	0.0431		0.00756	pCi/g	11/18/20 18:51	12/09/20 11:48	1
<b>Thorium 228</b>	<b>0.282</b>		0.0858	0.0907		0.0413	pCi/g	11/18/20 18:51	12/09/20 11:48	1
<b>Thorium-232</b>	<b>0.259</b>		0.216	0.218		0.0988	pCi/g	11/18/20 18:51	12/09/20 11:48	1
<b>Thorium-234</b>	<b>0.652</b>		0.509	0.514		0.311	pCi/g	11/18/20 18:51	12/09/20 11:48	1
Uranium-235	-0.0315	U	0.269	0.269		0.352	pCi/g	11/18/20 18:51	12/09/20 11:48	1
<b>Uranium-238</b>	<b>0.652</b>		0.509	0.514		0.311	pCi/g	11/18/20 18:51	12/09/20 11:48	1

**Client Sample ID: HPPG-ESU-TU108A-014**

**Lab Sample ID: 160-40338-14**

Date Collected: 11/09/20 14:10

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.270</b>		0.231	0.233		0.112	pCi/g	11/18/20 18:51	12/09/20 11:59	1
Actinium-227	0.0198	U	0.0359	0.0360		0.384	pCi/g	11/18/20 18:51	12/09/20 11:59	1
Bismuth-212	0.000	U	0.228	0.228		0.428	pCi/g	11/18/20 18:51	12/09/20 11:59	1
<b>Bismuth-214</b>	<b>0.397</b>		0.111	0.119		0.0439	pCi/g	11/18/20 18:51	12/09/20 11:59	1
Cesium-137	0.00224	U	0.0666	0.0666	0.0700	0.0547	pCi/g	11/18/20 18:51	12/09/20 11:59	1
Lead-210	0.427	U	1.03	1.03		0.807	pCi/g	11/18/20 18:51	12/09/20 11:59	1
<b>Lead-212</b>	<b>0.416</b>		0.0826	0.0986		0.0373	pCi/g	11/18/20 18:51	12/09/20 11:59	1
<b>Lead-214</b>	<b>0.440</b>		0.109	0.119		0.0465	pCi/g	11/18/20 18:51	12/09/20 11:59	1
<b>Potassium-40</b>	<b>9.13</b>		1.29	1.60		0.240	pCi/g	11/18/20 18:51	12/09/20 11:59	1
Protactinium-231	0.325	U	1.28	1.28		1.99	pCi/g	11/18/20 18:51	12/09/20 11:59	1
Protactinium-234	0.0328	U	0.276	0.276		0.226	pCi/g	11/18/20 18:51	12/09/20 11:59	1
<b>Radium-226</b>	<b>0.397</b>		0.111	0.119	0.200	0.0439	pCi/g	11/18/20 18:51	12/09/20 11:59	1
<b>Radium-228</b>	<b>0.270</b>		0.231	0.233		0.112	pCi/g	11/18/20 18:51	12/09/20 11:59	1
<b>Thallium-208</b>	<b>0.151</b>		0.0442	0.0469		0.0136	pCi/g	11/18/20 18:51	12/09/20 11:59	1
<b>Thorium 228</b>	<b>0.416</b>		0.0826	0.0986		0.0373	pCi/g	11/18/20 18:51	12/09/20 11:59	1
<b>Thorium-232</b>	<b>0.270</b>		0.231	0.233		0.112	pCi/g	11/18/20 18:51	12/09/20 11:59	1
<b>Thorium-234</b>	<b>1.23</b>		0.642	0.656		0.378	pCi/g	11/18/20 18:51	12/09/20 11:59	1
Uranium-235	0.134	U	0.439	0.439		0.357	pCi/g	11/18/20 18:51	12/09/20 11:59	1
<b>Uranium-238</b>	<b>1.23</b>		0.642	0.656		0.378	pCi/g	11/18/20 18:51	12/09/20 11:59	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-015**

**Lab Sample ID: 160-40338-15**

Date Collected: 11/09/20 14:14

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.545</b>		0.215	0.224		0.115	pCi/g	11/18/20 18:51	12/09/20 12:37	1
Actinium-227	0.176	U	0.502	0.502		0.346	pCi/g	11/18/20 18:51	12/09/20 12:37	1
Bismuth-212	-0.529	U	1.09	1.09		0.859	pCi/g	11/18/20 18:51	12/09/20 12:37	1
Bismuth-214	0.0697	U	0.0980	0.0984		0.159	pCi/g	11/18/20 18:51	12/09/20 12:37	1
Cesium-137	-0.00700	U	0.0879	0.0879	0.0700	0.0718	pCi/g	11/18/20 18:51	12/09/20 12:37	1
Lead-210	-0.949	U	1.94	1.95		1.64	pCi/g	11/18/20 18:51	12/09/20 12:37	1
<b>Lead-212</b>	<b>0.374</b>		0.0991	0.108		0.0532	pCi/g	11/18/20 18:51	12/09/20 12:37	1
<b>Lead-214</b>	<b>0.382</b>		0.131	0.139		0.0669	pCi/g	11/18/20 18:51	12/09/20 12:37	1
<b>Potassium-40</b>	<b>9.30</b>		1.55	1.89		0.321	pCi/g	11/18/20 18:51	12/09/20 12:37	1
Protactinium-231	0.000	U	0.466	0.466		2.49	pCi/g	11/18/20 18:51	12/09/20 12:37	1
Protactinium-234	0.0308	U	0.0678	0.0679		0.295	pCi/g	11/18/20 18:51	12/09/20 12:37	1
Radium-226	0.0697	U	0.0980	0.0984	0.200	0.159	pCi/g	11/18/20 18:51	12/09/20 12:37	1
<b>Radium-228</b>	<b>0.545</b>		0.215	0.224		0.115	pCi/g	11/18/20 18:51	12/09/20 12:37	1
<b>Thallium-208</b>	<b>0.102</b>		0.0506	0.0519		0.0225	pCi/g	11/18/20 18:51	12/09/20 12:37	1
<b>Thorium 228</b>	<b>0.374</b>		0.0991	0.108		0.0532	pCi/g	11/18/20 18:51	12/09/20 12:37	1
<b>Thorium-232</b>	<b>0.545</b>		0.215	0.224		0.115	pCi/g	11/18/20 18:51	12/09/20 12:37	1
Thorium-234	-0.577	U	0.867	0.870		0.880	pCi/g	11/18/20 18:51	12/09/20 12:37	1
Uranium-235	0.245	U	0.395	0.396		0.482	pCi/g	11/18/20 18:51	12/09/20 12:37	1
Uranium-238	-0.577	U	0.867	0.870		0.880	pCi/g	11/18/20 18:51	12/09/20 12:37	1

**Client Sample ID: HPPG-ESU-TU108A-016**

**Lab Sample ID: 160-40338-16**

Date Collected: 11/09/20 14:16

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.416</b>		0.232	0.236		0.0917	pCi/g	11/18/20 18:51	12/09/20 13:02	1
Actinium-227	-0.310	U	0.810	0.811		0.471	pCi/g	11/18/20 18:51	12/09/20 13:02	1
Bismuth-212	0.0508	U	0.884	0.884		0.724	pCi/g	11/18/20 18:51	12/09/20 13:02	1
<b>Bismuth-214</b>	<b>0.418</b>		0.159	0.165		0.0687	pCi/g	11/18/20 18:51	12/09/20 13:02	1
Cesium-137	-0.0319	U	0.0981	0.0982	0.0700	0.0786	pCi/g	11/18/20 18:51	12/09/20 13:02	1
Lead-210	-0.00480	U	1.53	1.53		1.25	pCi/g	11/18/20 18:51	12/09/20 13:02	1
<b>Lead-212</b>	<b>0.473</b>		0.126	0.140		0.0534	pCi/g	11/18/20 18:51	12/09/20 13:02	1
<b>Lead-214</b>	<b>0.304</b>		0.149	0.153		0.102	pCi/g	11/18/20 18:51	12/09/20 13:02	1
<b>Potassium-40</b>	<b>8.86</b>		1.57	1.81		0.282	pCi/g	11/18/20 18:51	12/09/20 13:02	1
Protactinium-231	0.455	U	1.47	1.47		2.32	pCi/g	11/18/20 18:51	12/09/20 13:02	1
Protactinium-234	0.139	U	0.225	0.225		0.235	pCi/g	11/18/20 18:51	12/09/20 13:02	1
<b>Radium-226</b>	<b>0.418</b>		0.159	0.165	0.200	0.0687	pCi/g	11/18/20 18:51	12/09/20 13:02	1
<b>Radium-228</b>	<b>0.416</b>		0.232	0.236		0.0917	pCi/g	11/18/20 18:51	12/09/20 13:02	1
<b>Thallium-208</b>	<b>0.165</b>		0.0672	0.0693		0.0283	pCi/g	11/18/20 18:51	12/09/20 13:02	1
<b>Thorium 228</b>	<b>0.473</b>		0.126	0.140		0.0534	pCi/g	11/18/20 18:51	12/09/20 13:02	1
<b>Thorium-232</b>	<b>0.416</b>		0.232	0.236		0.0917	pCi/g	11/18/20 18:51	12/09/20 13:02	1
Thorium-234	-0.483	U	1.37	1.37		1.14	pCi/g	11/18/20 18:51	12/09/20 13:02	1
Uranium-235	-0.0703	U	0.150	0.150		0.449	pCi/g	11/18/20 18:51	12/09/20 13:02	1
Uranium-238	-0.483	U	1.37	1.37		1.14	pCi/g	11/18/20 18:51	12/09/20 13:02	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-017**

**Lab Sample ID: 160-40338-17**

Date Collected: 11/09/20 14:18

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.379</b>		0.160	0.164		0.0849	pCi/g	11/18/20 18:51	12/09/20 11:47	1
Actinium-227	0.0972	U	0.395	0.396		0.306	pCi/g	11/18/20 18:51	12/09/20 11:47	1
Bismuth-212	0.370	U	0.747	0.748		0.569	pCi/g	11/18/20 18:51	12/09/20 11:47	1
<b>Bismuth-214</b>	<b>0.253</b>		0.145	0.147		0.0821	pCi/g	11/18/20 18:51	12/09/20 11:47	1
Cesium-137	0.000307	U	0.0818	0.0818	0.0700	0.0672	pCi/g	11/18/20 18:51	12/09/20 11:47	1
Lead-210	-0.793	U	1.19	1.20		1.08	pCi/g	11/18/20 18:51	12/09/20 11:47	1
<b>Lead-212</b>	<b>0.237</b>		0.0778	0.0836		0.0412	pCi/g	11/18/20 18:51	12/09/20 11:47	1
<b>Lead-214</b>	<b>0.281</b>		0.127	0.130		0.0700	pCi/g	11/18/20 18:51	12/09/20 11:47	1
<b>Potassium-40</b>	<b>6.49</b>		1.37	1.52		0.268	pCi/g	11/18/20 18:51	12/09/20 11:47	1
Protactinium-231	0.321	U	1.21	1.21		1.95	pCi/g	11/18/20 18:51	12/09/20 11:47	1
Protactinium-234	0.00891	U	0.0218	0.0218		0.178	pCi/g	11/18/20 18:51	12/09/20 11:47	1
<b>Radium-226</b>	<b>0.253</b>		0.145	0.147	0.200	0.0821	pCi/g	11/18/20 18:51	12/09/20 11:47	1
<b>Radium-228</b>	<b>0.379</b>		0.160	0.164		0.0849	pCi/g	11/18/20 18:51	12/09/20 11:47	1
<b>Thallium-208</b>	<b>0.141</b>		0.0511	0.0531		0.0149	pCi/g	11/18/20 18:51	12/09/20 11:47	1
<b>Thorium 228</b>	<b>0.237</b>		0.0778	0.0836		0.0412	pCi/g	11/18/20 18:51	12/09/20 11:47	1
<b>Thorium-232</b>	<b>0.379</b>		0.160	0.164		0.0849	pCi/g	11/18/20 18:51	12/09/20 11:47	1
Thorium-234	-0.132	U	0.515	0.516		0.430	pCi/g	11/18/20 18:51	12/09/20 11:47	1
Uranium-235	0.0525	U	0.145	0.145		0.243	pCi/g	11/18/20 18:51	12/09/20 11:47	1
Uranium-238	-0.132	U	0.515	0.516		0.430	pCi/g	11/18/20 18:51	12/09/20 11:47	1

**Client Sample ID: HPPG-ESU-TU108A-018**

**Lab Sample ID: 160-40338-18**

Date Collected: 11/09/20 14:19

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.236</b>		0.164	0.166		0.0735	pCi/g	11/18/20 18:51	12/09/20 12:25	1
Actinium-227	0.0682	U	0.211	0.211		0.274	pCi/g	11/18/20 18:51	12/09/20 12:25	1
Bismuth-212	-0.0245	U	0.340	0.340		0.487	pCi/g	11/18/20 18:51	12/09/20 12:25	1
Bismuth-214	0.0360	U	0.101	0.101		0.113	pCi/g	11/18/20 18:51	12/09/20 12:25	1
Cesium-137	0.00217	U	0.0316	0.0316	0.0700	0.0258	pCi/g	11/18/20 18:51	12/09/20 12:25	1
Lead-210	-0.591	U	1.09	1.10		0.873	pCi/g	11/18/20 18:51	12/09/20 12:25	1
<b>Lead-212</b>	<b>0.323</b>		0.0619	0.0747		0.0279	pCi/g	11/18/20 18:51	12/09/20 12:25	1
<b>Lead-214</b>	<b>0.246</b>		0.0822	0.0861		0.0393	pCi/g	11/18/20 18:51	12/09/20 12:25	1
<b>Potassium-40</b>	<b>7.44</b>		1.01	1.27		0.213	pCi/g	11/18/20 18:51	12/09/20 12:25	1
Protactinium-231	-0.630	U	1.99	1.99		1.62	pCi/g	11/18/20 18:51	12/09/20 12:25	1
Protactinium-234	0.0549	U	0.0878	0.0880		0.172	pCi/g	11/18/20 18:51	12/09/20 12:25	1
Radium-226	0.0360	U	0.101	0.101	0.200	0.113	pCi/g	11/18/20 18:51	12/09/20 12:25	1
<b>Radium-228</b>	<b>0.236</b>		0.164	0.166		0.0735	pCi/g	11/18/20 18:51	12/09/20 12:25	1
<b>Thallium-208</b>	<b>0.121</b>		0.0419	0.0438		0.0155	pCi/g	11/18/20 18:51	12/09/20 12:25	1
<b>Thorium 228</b>	<b>0.323</b>		0.0619	0.0747		0.0279	pCi/g	11/18/20 18:51	12/09/20 12:25	1
<b>Thorium-232</b>	<b>0.236</b>		0.164	0.166		0.0735	pCi/g	11/18/20 18:51	12/09/20 12:25	1
Thorium-234	0.000	U	0.312	0.312		0.615	pCi/g	11/18/20 18:51	12/09/20 12:25	1
Uranium-235	0.0834	U	0.171	0.172		0.307	pCi/g	11/18/20 18:51	12/09/20 12:25	1
Uranium-238	0.000	U	0.312	0.312		0.615	pCi/g	11/18/20 18:51	12/09/20 12:25	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-019**

**Lab Sample ID: 160-40338-19**

Date Collected: 11/09/20 14:22

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.368</b>		0.222	0.225		0.0948	pCi/g	11/18/20 18:51	12/09/20 12:24	1
Actinium-227	-0.124	U	0.449	0.449		0.273	pCi/g	11/18/20 18:51	12/09/20 12:24	1
Bismuth-212	0.000	U	0.239	0.239		0.491	pCi/g	11/18/20 18:51	12/09/20 12:24	1
<b>Bismuth-214</b>	<b>0.475</b>		0.125	0.134		0.0427	pCi/g	11/18/20 18:51	12/09/20 12:24	1
Cesium-137	-0.0469	U	0.0794	0.0796	0.0700	0.0620	pCi/g	11/18/20 18:51	12/09/20 12:24	1
Lead-210	0.721	U	1.12	1.12		0.782	pCi/g	11/18/20 18:51	12/09/20 12:24	1
<b>Lead-212</b>	<b>0.295</b>		0.0695	0.0760		0.0332	pCi/g	11/18/20 18:51	12/09/20 12:24	1
<b>Lead-214</b>	<b>0.413</b>		0.102	0.111		0.0397	pCi/g	11/18/20 18:51	12/09/20 12:24	1
<b>Potassium-40</b>	<b>7.66</b>		1.32	1.53		0.188	pCi/g	11/18/20 18:51	12/09/20 12:24	1
Protactinium-231	-0.778	U	2.65	2.65		2.16	pCi/g	11/18/20 18:51	12/09/20 12:24	1
Protactinium-234	0.0433	U	0.143	0.143		0.185	pCi/g	11/18/20 18:51	12/09/20 12:24	1
<b>Radium-226</b>	<b>0.475</b>		0.125	0.134	0.200	0.0427	pCi/g	11/18/20 18:51	12/09/20 12:24	1
<b>Radium-228</b>	<b>0.368</b>		0.222	0.225		0.0948	pCi/g	11/18/20 18:51	12/09/20 12:24	1
<b>Thallium-208</b>	<b>0.196</b>		0.0574	0.0608		0.0145	pCi/g	11/18/20 18:51	12/09/20 12:24	1
<b>Thorium 228</b>	<b>0.295</b>		0.0695	0.0760		0.0332	pCi/g	11/18/20 18:51	12/09/20 12:24	1
<b>Thorium-232</b>	<b>0.368</b>		0.222	0.225		0.0948	pCi/g	11/18/20 18:51	12/09/20 12:24	1
<b>Thorium-234</b>	<b>0.666</b>		0.497	0.502		0.308	pCi/g	11/18/20 18:51	12/09/20 12:24	1
Uranium-235	0.108	U	0.256	0.256		0.302	pCi/g	11/18/20 18:51	12/09/20 12:24	1
<b>Uranium-238</b>	<b>0.666</b>		0.497	0.502		0.308	pCi/g	11/18/20 18:51	12/09/20 12:24	1

**Client Sample ID: HPPG-ESU-TU108A-020**

**Lab Sample ID: 160-40338-20**

Date Collected: 11/09/20 14:23

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.181</b>		0.173	0.174		0.0956	pCi/g	11/18/20 18:51	12/09/20 12:32	1
Actinium-227	-0.259	U	0.521	0.522		0.313	pCi/g	11/18/20 18:51	12/09/20 12:32	1
Bismuth-212	-0.231	U	0.680	0.680		0.540	pCi/g	11/18/20 18:51	12/09/20 12:32	1
<b>Bismuth-214</b>	<b>0.248</b>		0.0984	0.102		0.0467	pCi/g	11/18/20 18:51	12/09/20 12:32	1
Cesium-137	-0.00489	U	0.0515	0.0515	0.0700	0.0420	pCi/g	11/18/20 18:51	12/09/20 12:32	1
Lead-210	-0.687	U	1.60	1.61		1.34	pCi/g	11/18/20 18:51	12/09/20 12:32	1
<b>Lead-212</b>	<b>0.237</b>		0.0672	0.0739		0.0352	pCi/g	11/18/20 18:51	12/09/20 12:32	1
<b>Lead-214</b>	<b>0.396</b>		0.0946	0.103		0.0370	pCi/g	11/18/20 18:51	12/09/20 12:32	1
<b>Potassium-40</b>	<b>7.39</b>		1.16	1.39		0.237	pCi/g	11/18/20 18:51	12/09/20 12:32	1
Protactinium-231	-0.0000000	U	2.30	2.30		1.89	pCi/g	11/18/20 18:51	12/09/20 12:32	1
	236									
Protactinium-234	0.0376	U	0.0512	0.0513		0.220	pCi/g	11/18/20 18:51	12/09/20 12:32	1
<b>Radium-226</b>	<b>0.248</b>		0.0984	0.102	0.200	0.0467	pCi/g	11/18/20 18:51	12/09/20 12:32	1
<b>Radium-228</b>	<b>0.181</b>		0.173	0.174		0.0956	pCi/g	11/18/20 18:51	12/09/20 12:32	1
<b>Thallium-208</b>	<b>0.168</b>		0.0459	0.0491		0.0135	pCi/g	11/18/20 18:51	12/09/20 12:32	1
<b>Thorium 228</b>	<b>0.237</b>		0.0672	0.0739		0.0352	pCi/g	11/18/20 18:51	12/09/20 12:32	1
<b>Thorium-232</b>	<b>0.181</b>		0.173	0.174		0.0956	pCi/g	11/18/20 18:51	12/09/20 12:32	1
Thorium-234	0.206	U	0.454	0.455		0.357	pCi/g	11/18/20 18:51	12/09/20 12:32	1
Uranium-235	0.0806	U	0.185	0.185		0.358	pCi/g	11/18/20 18:51	12/09/20 12:32	1
Uranium-238	0.206	U	0.454	0.455		0.357	pCi/g	11/18/20 18:51	12/09/20 12:32	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-021**

**Lab Sample ID: 160-40338-21**

Date Collected: 11/09/20 14:25

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	-0.120	U	0.157	0.157	0.331	0.137	pCi/g	11/30/20 10:34	12/09/20 17:59	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	99.0		40 - 110					11/30/20 10:34	12/09/20 17:59	1
Y Carrier	92.3		40 - 110					11/30/20 10:34	12/09/20 17:59	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
<b>Actinium 228</b>	<b>0.691</b>		0.167	0.181		0.0276	pCi/g	11/20/20 14:56	12/11/20 09:50	1
Actinium-227	-0.0652	U	0.529	0.529		0.327	pCi/g	11/20/20 14:56	12/11/20 09:50	1
Bismuth-212	-0.351	U	0.818	0.818		0.646	pCi/g	11/20/20 14:56	12/11/20 09:50	1
<b>Bismuth-214</b>	<b>0.463</b>		0.121	0.131		0.0465	pCi/g	11/20/20 14:56	12/11/20 09:50	1
Cesium-137	0.0212	U	0.0636	0.0637	0.0700	0.0507	pCi/g	11/20/20 14:56	12/11/20 09:50	1
<b>Lead-210</b>	<b>1.54</b>		1.56	1.57		0.959	pCi/g	11/20/20 14:56	12/11/20 09:50	1
<b>Lead-212</b>	<b>0.388</b>		0.0879	0.101		0.0449	pCi/g	11/20/20 14:56	12/11/20 09:50	1
<b>Lead-214</b>	<b>0.530</b>		0.136	0.147		0.0566	pCi/g	11/20/20 14:56	12/11/20 09:50	1
<b>Potassium-40</b>	<b>8.85</b>		1.32	1.60		0.256	pCi/g	11/20/20 14:56	12/11/20 09:50	1
Protactinium-231	-0.582	U	2.59	2.59		2.11	pCi/g	11/20/20 14:56	12/11/20 09:50	1
Protactinium-234	0.0992	U	0.301	0.301		0.224	pCi/g	11/20/20 14:56	12/11/20 09:50	1
<b>Radium-226</b>	<b>0.463</b>		0.121	0.131	0.200	0.0465	pCi/g	11/20/20 14:56	12/11/20 09:50	1
<b>Radium-228</b>	<b>0.691</b>		0.167	0.181		0.0276	pCi/g	11/20/20 14:56	12/11/20 09:50	1
<b>Thallium-208</b>	<b>0.100</b>		0.0739	0.0747		0.0375	pCi/g	11/20/20 14:56	12/11/20 09:50	1
<b>Thorium 228</b>	<b>0.388</b>		0.0879	0.101		0.0449	pCi/g	11/20/20 14:56	12/11/20 09:50	1
<b>Thorium-232</b>	<b>0.691</b>		0.167	0.181		0.0276	pCi/g	11/20/20 14:56	12/11/20 09:50	1
Thorium-234	0.285	U	0.568	0.569		0.450	pCi/g	11/20/20 14:56	12/11/20 09:50	1
Uranium-235	0.000	U	0.189	0.189		0.387	pCi/g	11/20/20 14:56	12/11/20 09:50	1
Uranium-238	0.285	U	0.568	0.569		0.450	pCi/g	11/20/20 14:56	12/11/20 09:50	1

**Client Sample ID: HPPG-ESU-TU108A-022**

**Lab Sample ID: 160-40338-22**

Date Collected: 11/09/20 14:26

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
<b>Actinium 228</b>	<b>0.602</b>		0.191	0.203		0.0368	pCi/g	11/20/20 14:56	12/11/20 09:38	1
Actinium-227	0.168	U	0.401	0.402		0.351	pCi/g	11/20/20 14:56	12/11/20 09:38	1
Bismuth-212	-0.0171	U	0.821	0.821		0.674	pCi/g	11/20/20 14:56	12/11/20 09:38	1
<b>Bismuth-214</b>	<b>0.386</b>		0.121	0.129		0.0444	pCi/g	11/20/20 14:56	12/11/20 09:38	1
Cesium-137	-0.0248	U	0.0687	0.0688	0.0700	0.0541	pCi/g	11/20/20 14:56	12/11/20 09:38	1
Lead-210	-0.995	U	1.76	1.76		1.49	pCi/g	11/20/20 14:56	12/11/20 09:38	1
<b>Lead-212</b>	<b>0.377</b>		0.106	0.115		0.0503	pCi/g	11/20/20 14:56	12/11/20 09:38	1
<b>Lead-214</b>	<b>0.243</b>		0.166	0.169		0.121	pCi/g	11/20/20 14:56	12/11/20 09:38	1
<b>Potassium-40</b>	<b>8.02</b>		1.46	1.73		0.325	pCi/g	11/20/20 14:56	12/11/20 09:38	1
Protactinium-231	0.723	U	1.91	1.91		2.10	pCi/g	11/20/20 14:56	12/11/20 09:38	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-022**

**Lab Sample ID: 160-40338-22**

Date Collected: 11/09/20 14:26

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.00807	U	0.0171	0.0172		0.294	pCi/g	11/20/20 14:56	12/11/20 09:38	1
<b>Radium-226</b>	<b>0.386</b>		0.121	0.129	0.200	0.0444	pCi/g	11/20/20 14:56	12/11/20 09:38	1
<b>Radium-228</b>	<b>0.602</b>		0.191	0.203		0.0368	pCi/g	11/20/20 14:56	12/11/20 09:38	1
<b>Thallium-208</b>	<b>0.107</b>		0.0551	0.0565		0.0241	pCi/g	11/20/20 14:56	12/11/20 09:38	1
<b>Thorium 228</b>	<b>0.377</b>		0.106	0.115		0.0503	pCi/g	11/20/20 14:56	12/11/20 09:38	1
<b>Thorium-232</b>	<b>0.602</b>		0.191	0.203		0.0368	pCi/g	11/20/20 14:56	12/11/20 09:38	1
Thorium-234	-0.586	U	0.810	0.813		0.893	pCi/g	11/20/20 14:56	12/11/20 09:38	1
Uranium-235	0.185	U	0.473	0.473		0.516	pCi/g	11/20/20 14:56	12/11/20 09:38	1
Uranium-238	-0.586	U	0.810	0.813		0.893	pCi/g	11/20/20 14:56	12/11/20 09:38	1

**Client Sample ID: HPPG-ESU-TU108A-023**

**Lab Sample ID: 160-40338-23**

Date Collected: 11/09/20 14:28

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.540</b>		0.127	0.138		0.0214	pCi/g	11/20/20 14:56	12/11/20 09:02	1
Actinium-227	-0.256	U	0.528	0.529		0.306	pCi/g	11/20/20 14:56	12/11/20 09:02	1
Bismuth-212	0.237	U	0.436	0.436		0.331	pCi/g	11/20/20 14:56	12/11/20 09:02	1
<b>Bismuth-214</b>	<b>0.353</b>		0.0984	0.105		0.0395	pCi/g	11/20/20 14:56	12/11/20 09:02	1
Cesium-137	0.0263	U	0.0520	0.0521	0.0700	0.0407	pCi/g	11/20/20 14:56	12/11/20 09:02	1
Lead-210	-0.643	U	1.17	1.17		0.931	pCi/g	11/20/20 14:56	12/11/20 09:02	1
<b>Lead-212</b>	<b>0.335</b>		0.0678	0.0804		0.0314	pCi/g	11/20/20 14:56	12/11/20 09:02	1
<b>Lead-214</b>	<b>0.246</b>		0.0995	0.103		0.0486	pCi/g	11/20/20 14:56	12/11/20 09:02	1
<b>Potassium-40</b>	<b>8.59</b>		1.12	1.42		0.0844	pCi/g	11/20/20 14:56	12/11/20 09:02	1
Protactinium-231	0.000	U	0.752	0.752		1.78	pCi/g	11/20/20 14:56	12/11/20 09:02	1
Protactinium-234	-0.0907	U	0.184	0.184		0.148	pCi/g	11/20/20 14:56	12/11/20 09:02	1
<b>Radium-226</b>	<b>0.353</b>		0.0984	0.105	0.200	0.0395	pCi/g	11/20/20 14:56	12/11/20 09:02	1
<b>Radium-228</b>	<b>0.540</b>		0.127	0.138		0.0214	pCi/g	11/20/20 14:56	12/11/20 09:02	1
<b>Thallium-208</b>	<b>0.142</b>		0.0388	0.0415		0.00880	pCi/g	11/20/20 14:56	12/11/20 09:02	1
<b>Thorium 228</b>	<b>0.335</b>		0.0678	0.0804		0.0314	pCi/g	11/20/20 14:56	12/11/20 09:02	1
<b>Thorium-232</b>	<b>0.540</b>		0.127	0.138		0.0214	pCi/g	11/20/20 14:56	12/11/20 09:02	1
Thorium-234	0.128	U	0.467	0.467		0.800	pCi/g	11/20/20 14:56	12/11/20 09:02	1
Uranium-235	0.163	U	0.297	0.298		0.268	pCi/g	11/20/20 14:56	12/11/20 09:02	1
Uranium-238	0.128	U	0.467	0.467		0.800	pCi/g	11/20/20 14:56	12/11/20 09:02	1

**Client Sample ID: HPPG-ESU-TU108A-024**

**Lab Sample ID: 160-40338-24**

Date Collected: 11/09/20 14:33

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.500</b>		0.171	0.179		0.0342	pCi/g	11/20/20 14:56	12/11/20 09:41	1
Actinium-227	-0.299	U	0.596	0.597		0.359	pCi/g	11/20/20 14:56	12/11/20 09:41	1

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# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-ESU-TU108A-024**

**Lab Sample ID: 160-40338-24**

Date Collected: 11/09/20 14:33

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	0.000	U	0.348	0.348		0.520	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Bismuth-214</b>	<b>0.418</b>		0.132	0.139		0.0488	pCi/g	11/20/20 14:56	12/11/20 09:41	1
Cesium-137	-0.00127	U	0.0653	0.0653	0.0700	0.0537	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Lead-210</b>	<b>1.16</b>		1.24	1.25		0.816	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Lead-212</b>	<b>0.368</b>		0.0798	0.0886		0.0364	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Lead-214</b>	<b>0.396</b>		0.113	0.120		0.0605	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Potassium-40</b>	<b>7.86</b>		1.40	1.61		0.208	pCi/g	11/20/20 14:56	12/11/20 09:41	1
Protactinium-231	0.516	U	1.69	1.69		1.85	pCi/g	11/20/20 14:56	12/11/20 09:41	1
Protactinium-234	-0.0844	U	0.262	0.262		0.213	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Radium-226</b>	<b>0.418</b>		0.132	0.139	0.200	0.0488	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Radium-228</b>	<b>0.500</b>		0.171	0.179		0.0342	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Thallium-208</b>	<b>0.192</b>		0.0514	0.0550		0.00800	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Thorium 228</b>	<b>0.368</b>		0.0798	0.0886		0.0364	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Thorium-232</b>	<b>0.500</b>		0.171	0.179		0.0342	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Thorium-234</b>	<b>0.514</b>		0.453	0.457		0.353	pCi/g	11/20/20 14:56	12/11/20 09:41	1
Uranium-235	0.0479	U	0.137	0.137		0.333	pCi/g	11/20/20 14:56	12/11/20 09:41	1
<b>Uranium-238</b>	<b>0.514</b>		0.453	0.457		0.353	pCi/g	11/20/20 14:56	12/11/20 09:41	1

**Client Sample ID: HPPG-ESU-TU108A-025**

**Lab Sample ID: 160-40338-25**

Date Collected: 11/09/20 14:35

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.374</b>		0.160	0.164		0.0413	pCi/g	11/20/20 14:56	12/11/20 09:40	1
Actinium-227	0.0276	U	0.0845	0.0845		0.394	pCi/g	11/20/20 14:56	12/11/20 09:40	1
Bismuth-212	0.0144	U	0.797	0.797		0.654	pCi/g	11/20/20 14:56	12/11/20 09:40	1
<b>Bismuth-214</b>	<b>0.328</b>		0.135	0.139		0.0726	pCi/g	11/20/20 14:56	12/11/20 09:40	1
Cesium-137	-0.0454	U	0.151	0.151	0.0700	0.0876	pCi/g	11/20/20 14:56	12/11/20 09:40	1
Lead-210	-0.218	U	1.56	1.56		1.11	pCi/g	11/20/20 14:56	12/11/20 09:40	1
<b>Lead-212</b>	<b>0.434</b>		0.0999	0.115		0.0465	pCi/g	11/20/20 14:56	12/11/20 09:40	1
<b>Lead-214</b>	<b>0.366</b>		0.130	0.136		0.0729	pCi/g	11/20/20 14:56	12/11/20 09:40	1
<b>Potassium-40</b>	<b>7.47</b>		1.50	1.69		0.282	pCi/g	11/20/20 14:56	12/11/20 09:40	1
Protactinium-231	-0.929	U	2.84	2.85		2.30	pCi/g	11/20/20 14:56	12/11/20 09:40	1
Protactinium-234	-0.0955	U	0.246	0.246		0.199	pCi/g	11/20/20 14:56	12/11/20 09:40	1
<b>Radium-226</b>	<b>0.328</b>		0.135	0.139	0.200	0.0726	pCi/g	11/20/20 14:56	12/11/20 09:40	1
<b>Radium-228</b>	<b>0.374</b>		0.160	0.164		0.0413	pCi/g	11/20/20 14:56	12/11/20 09:40	1
<b>Thallium-208</b>	<b>0.176</b>		0.0667	0.0691		0.0227	pCi/g	11/20/20 14:56	12/11/20 09:40	1
<b>Thorium 228</b>	<b>0.434</b>		0.0999	0.115		0.0465	pCi/g	11/20/20 14:56	12/11/20 09:40	1
<b>Thorium-232</b>	<b>0.374</b>		0.160	0.164		0.0413	pCi/g	11/20/20 14:56	12/11/20 09:40	1
Thorium-234	-0.711	U	0.564	0.570		0.839	pCi/g	11/20/20 14:56	12/11/20 09:40	1
Uranium-235	0.0809	U	0.193	0.193		0.272	pCi/g	11/20/20 14:56	12/11/20 09:40	1
Uranium-238	-0.711	U	0.564	0.570		0.839	pCi/g	11/20/20 14:56	12/11/20 09:40	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-F-031**

**Lab Sample ID: 160-40338-26**

Date Collected: 11/09/20 13:30

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	0.148		0.182	0.182	0.331	0.139	pCi/g	12/16/20 14:29	01/04/21 13:52	1
<i>Carrier</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Sr Carrier	95.2		40 - 110					12/16/20 14:29	01/04/21 13:52	1
Y Carrier	87.1		40 - 110					12/16/20 14:29	01/04/21 13:52	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.416		0.107	0.115		0.0219	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Actinium-227	-0.0253	U	0.0483	0.0484		0.331	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Bismuth-212	-0.0585	U	0.716	0.716		0.473	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Bismuth-214	0.431		0.101	0.110		0.0414	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Cesium-137	0.00536	U	0.0623	0.0623	0.0700	0.0510	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Lead-210	0.0763	U	1.10	1.10		0.902	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Lead-212	0.402		0.0746	0.0909		0.0341	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Lead-214	0.331		0.0837	0.0905		0.0446	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Potassium-40	8.23		1.15	1.42		0.245	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Protactinium-231	0.000	U	0.239	0.239		1.64	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Protactinium-234	0.0460	U	0.142	0.143		0.172	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Radium-226	0.431		0.101	0.110	0.200	0.0414	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Radium-228	0.416		0.107	0.115		0.0219	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Thallium-208	0.161		0.0407	0.0440		0.0104	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Thorium 228	0.402		0.0746	0.0909		0.0341	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Thorium-232	0.416		0.107	0.115		0.0219	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Thorium-234	0.187	U	0.473	0.473		0.790	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Uranium-235	-0.140	U	0.301	0.301		0.242	pCi/g	11/20/20 14:56	12/11/20 10:58	1
Uranium-238	0.187	U	0.473	0.473		0.790	pCi/g	11/20/20 14:56	12/11/20 10:58	1

**Client Sample ID: HPPG-F-032**

**Lab Sample ID: 160-40338-27**

Date Collected: 11/09/20 13:59

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.716		0.179	0.194		0.110	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Actinium-227	0.161	U	0.319	0.320		0.394	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Bismuth-212	-0.674	U	1.04	1.04		0.804	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Bismuth-214	0.409		0.133	0.139		0.0533	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Cesium-137	0.0287	U	0.0598	0.0598	0.0700	0.0462	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Lead-210	-0.0861	U	1.23	1.23		1.01	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Lead-212	0.432		0.108	0.121		0.0633	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Lead-214	0.452		0.123	0.132		0.0599	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Potassium-40	9.21		1.50	1.77		0.251	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Protactinium-231	-0.998	U	2.93	2.94		2.38	pCi/g	11/20/20 14:56	12/11/20 09:49	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

**Client Sample ID: HPPG-F-032**

**Lab Sample ID: 160-40338-27**

Date Collected: 11/09/20 13:59

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0752	U	0.158	0.158		0.236	pCi/g	11/20/20 14:56	12/11/20 09:49	1
<b>Radium-226</b>	<b>0.409</b>		0.133	0.139	0.200	0.0533	pCi/g	11/20/20 14:56	12/11/20 09:49	1
<b>Radium-228</b>	<b>0.716</b>		0.179	0.194		0.110	pCi/g	11/20/20 14:56	12/11/20 09:49	1
<b>Thallium-208</b>	<b>0.129</b>		0.0935	0.0944		0.0473	pCi/g	11/20/20 14:56	12/11/20 09:49	1
<b>Thorium 228</b>	<b>0.432</b>		0.108	0.121		0.0633	pCi/g	11/20/20 14:56	12/11/20 09:49	1
<b>Thorium-232</b>	<b>0.716</b>		0.179	0.194		0.110	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Thorium-234	-0.869	U	0.793	0.799		1.16	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Uranium-235	-0.234	U	0.284	0.285		0.463	pCi/g	11/20/20 14:56	12/11/20 09:49	1
Uranium-238	-0.869	U	0.793	0.799		1.16	pCi/g	11/20/20 14:56	12/11/20 09:49	1

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

## Method: 905 - Strontium-90 (GFPC)

**Lab Sample ID: MB 160-490555/21-A**  
**Matrix: Solid**  
**Analysis Batch: 491299**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 490555**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)							
Strontium-90	0.03921	U	0.147	0.147	0.331	0.118	pCi/g	11/30/20 10:37	12/09/20 17:59	1	
Carrier		MB MB	Limits			LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
		%Yield Qualifier									
Sr Carrier		105		40 - 110							
Y Carrier		92.3	40 - 110					11/30/20 10:37	12/09/20 17:59	1	

**Lab Sample ID: LCS 160-490555/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491328**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 490555**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Strontium-90	7.76	6.009		0.646	0.331	0.105	pCi/g	77	75 - 125	
Carrier		LCS LCS	Limits			LOQ	DLC	Unit	%Rec	%Rec. Limits
		%Yield Qualifier								
Sr Carrier		105		40 - 110						
Y Carrier		93.1	40 - 110							

**Lab Sample ID: MB 160-492111/22-A**  
**Matrix: Solid**  
**Analysis Batch: 493835**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 492111**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)							
Strontium-90	-0.03798	U	0.125	0.125	0.331	0.106	pCi/g	12/16/20 14:29	01/04/21 13:58	1	
Carrier		MB MB	Limits			LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
		%Yield Qualifier									
Sr Carrier		96.8		40 - 110							
Y Carrier		94.6	40 - 110					12/16/20 14:29	01/04/21 13:58	1	

**Lab Sample ID: LCS 160-492111/1-A**  
**Matrix: Solid**  
**Analysis Batch: 493723**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 492111**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Strontium-90	7.75	6.756		0.712	0.331	0.115	pCi/g	87	75 - 125	
Carrier		LCS LCS	Limits			LOQ	DLC	Unit	%Rec	%Rec. Limits
		%Yield Qualifier								
Sr Carrier		102		40 - 110						
Y Carrier		94.6	40 - 110							

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID: MB 160-489475/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491214**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 489475**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.1879		0.109	0.110		0.0365	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Actinium-227	0.05016	U	0.128	0.129		0.327	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Bismuth-212	-0.2677	U	0.731	0.732		0.571	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Bismuth-214	0.03401	U	0.0601	0.0602		0.140	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Cesium-137	0.01805	U	0.0441	0.0442	0.0700	0.0334	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Lead-210	1.532		1.27	1.28		0.824	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Lead-212	-0.02151	U	0.0778	0.0778		0.0653	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Lead-214	0.01450	U	0.0254	0.0254		0.0787	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Potassium-40	-0.03979	U	0.410	0.410		0.339	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Protactinium-231	0.5424	U	2.16	2.17		1.75	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Protactinium-234	0.1191	U	0.0794	0.0804		0.247	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Radium-226	0.03401	U	0.0601	0.0602	0.200	0.140	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Radium-228	0.1879		0.109	0.110		0.0365	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Thallium-208	0.02724		0.0457	0.0458		0.0268	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Thorium 228	-0.02151	U	0.0778	0.0778		0.0653	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Thorium-232	0.1879		0.109	0.110		0.0365	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Thorium-234	0.1590	U	0.615	0.615		0.425	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Uranium-235	0.09807	U	0.373	0.373		0.265	pCi/g	11/18/20 18:51	12/09/20 09:08	1
Uranium-238	0.1590	U	0.615	0.615		0.425	pCi/g	11/18/20 18:51	12/09/20 09:08	1

**Lab Sample ID: LCS 160-489475/2-A**  
**Matrix: Solid**  
**Analysis Batch: 491216**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 489475**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Americium-241	96.4	97.03		12.6		0.673	pCi/g	101	87 - 116
Cesium-137	26.7	29.61		3.52	0.0700	0.141	pCi/g	111	87 - 120
Cobalt-60	9.48	10.43		1.25		0.104	pCi/g	110	87 - 115

**Lab Sample ID: 160-40338-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 491388**

**Client Sample ID: HPPG-ESU-TU108A-001**  
**Prep Type: Total/NA**  
**Prep Batch: 489475**

Analyte	Sample Sample		DU DU		Total	LOQ	DLC	Unit	RER	RER
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					Limit
Actinium 228	0.506		0.6365		0.240		0.0649	pCi/g	0.29	1
Actinium-227	0.623		0.1883	U	0.419		0.385	pCi/g	0.47	1
Bismuth-212	-0.00431	U	0.3884	U	1.28		1.03	pCi/g	0.22	1
Bismuth-214	0.484		0.5530		0.162		0.0533	pCi/g	0.20	1
Cesium-137	-0.0669	U	0.02118	U	0.0812	0.0700	0.0651	pCi/g	0.71	1
Lead-210	-0.363	U	0.5061	U	1.25		0.919	pCi/g	0.32	1
Lead-212	0.400		0.3302		0.107		0.0587	pCi/g	0.32	1
Lead-214	0.349		0.3726		0.138		0.0601	pCi/g	0.09	1
Potassium-40	7.98		9.533		2.00		0.438	pCi/g	0.40	1
Protactinium-231	-0.908	U	0.4008	U	1.64		2.56	pCi/g	0.30	1
Protactinium-234	-0.0933	U	-0.1231	U	0.384		0.313	pCi/g	0.05	1
Radium-226	0.484		0.5530		0.162	0.200	0.0533	pCi/g	0.20	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID: 160-40338-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 491388**

**Client Sample ID: HPPG-ESU-TU108A-001**  
**Prep Type: Total/NA**  
**Prep Batch: 489475**

Analyte	Sample		DU		Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual						
Radium-228	0.506		0.6365		0.240		0.0649	pCi/g	0.29	1
Thallium-208	0.258		0.1336		0.117		0.0513	pCi/g	0.59	1
Thorium 228	0.400		0.3302		0.107		0.0587	pCi/g	0.32	1
Thorium-232	0.506		0.6365		0.240		0.0649	pCi/g	0.29	1
Thorium-234	0.276	U	-0.5650	U	0.891		0.970	pCi/g	0.63	1
Uranium-235	-0.172	U	0.1337	U	0.314		0.543	pCi/g	0.54	1
Uranium-238	0.276	U	-0.5650	U	0.891		0.970	pCi/g	0.63	1

**Lab Sample ID: MB 160-489844/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491443**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 489844**

Analyte	MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Actinium 228	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Actinium-227	0.06310	U	0.159	0.159		0.330	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-212	0.0000	U	0.133	0.133		0.335	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-214	-0.008210	U	0.114	0.114		0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Cesium-137	0.007259	U	0.0689	0.0689	0.0700	0.0558	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-210	1.261		1.60	1.61		1.05	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-212	0.01003	U	0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-214	0.03327	U	0.0785	0.0786		0.0761	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Potassium-40	-0.5926	U	0.723	0.726		0.723	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-231	0.3075	U	0.995	0.995		0.778	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-234	0.03644	U	0.0817	0.0817		0.166	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-226	-0.008210	U	0.114	0.114	0.200	0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-228	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thallium-208	0.04141		0.0370	0.0373		0.0238	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium 228	0.01003	U	0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-232	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-234	-1.112	U	0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-235	-0.04770	U	0.334	0.334		0.304	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-238	-1.112	U	0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1

**Lab Sample ID: LCS 160-489844/2-A**  
**Matrix: Solid**  
**Analysis Batch: 491441**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 489844**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec.	
								%Rec	Limits
Americium-241	96.4	97.37		10.2		0.588	pCi/g	101	87 - 116
Cesium-137	26.7	26.30		2.84	0.0700	0.0907	pCi/g	98	87 - 120
Cobalt-60	9.47	9.183		0.997		0.0186	pCi/g	97	87 - 115

# QC Association Summary

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

## Rad

### Leach Batch: 489003

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40338-1	HPPG-ESU-TU108A-001	Total/NA	Solid	Dry and Grind	
160-40338-2	HPPG-ESU-TU108A-002	Total/NA	Solid	Dry and Grind	
160-40338-3	HPPG-ESU-TU108A-003	Total/NA	Solid	Dry and Grind	
160-40338-4	HPPG-ESU-TU108A-004	Total/NA	Solid	Dry and Grind	
160-40338-5	HPPG-ESU-TU108A-005	Total/NA	Solid	Dry and Grind	
160-40338-6	HPPG-ESU-TU108A-006	Total/NA	Solid	Dry and Grind	
160-40338-7	HPPG-ESU-TU108A-007	Total/NA	Solid	Dry and Grind	
160-40338-8	HPPG-ESU-TU108A-008	Total/NA	Solid	Dry and Grind	
160-40338-9	HPPG-ESU-TU108A-009	Total/NA	Solid	Dry and Grind	
160-40338-10	HPPG-ESU-TU108A-010	Total/NA	Solid	Dry and Grind	
160-40338-11	HPPG-ESU-TU108A-011	Total/NA	Solid	Dry and Grind	
160-40338-12	HPPG-ESU-TU108A-012	Total/NA	Solid	Dry and Grind	
160-40338-13	HPPG-ESU-TU108A-013	Total/NA	Solid	Dry and Grind	
160-40338-14	HPPG-ESU-TU108A-014	Total/NA	Solid	Dry and Grind	
160-40338-15	HPPG-ESU-TU108A-015	Total/NA	Solid	Dry and Grind	
160-40338-16	HPPG-ESU-TU108A-016	Total/NA	Solid	Dry and Grind	
160-40338-17	HPPG-ESU-TU108A-017	Total/NA	Solid	Dry and Grind	
160-40338-18	HPPG-ESU-TU108A-018	Total/NA	Solid	Dry and Grind	
160-40338-19	HPPG-ESU-TU108A-019	Total/NA	Solid	Dry and Grind	
160-40338-20	HPPG-ESU-TU108A-020	Total/NA	Solid	Dry and Grind	
160-40338-21	HPPG-ESU-TU108A-021	Total/NA	Solid	Dry and Grind	
160-40338-22	HPPG-ESU-TU108A-022	Total/NA	Solid	Dry and Grind	
160-40338-23	HPPG-ESU-TU108A-023	Total/NA	Solid	Dry and Grind	
160-40338-24	HPPG-ESU-TU108A-024	Total/NA	Solid	Dry and Grind	
160-40338-1 DU	HPPG-ESU-TU108A-001	Total/NA	Solid	Dry and Grind	

### Leach Batch: 489016

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40338-25	HPPG-ESU-TU108A-025	Total/NA	Solid	Dry and Grind	
160-40338-26	HPPG-F-031	Total/NA	Solid	Dry and Grind	
160-40338-27	HPPG-F-032	Total/NA	Solid	Dry and Grind	

### Prep Batch: 489475

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40338-1	HPPG-ESU-TU108A-001	Total/NA	Solid	Fill_Geo-21	489003
160-40338-2	HPPG-ESU-TU108A-002	Total/NA	Solid	Fill_Geo-21	489003
160-40338-3	HPPG-ESU-TU108A-003	Total/NA	Solid	Fill_Geo-21	489003
160-40338-4	HPPG-ESU-TU108A-004	Total/NA	Solid	Fill_Geo-21	489003
160-40338-5	HPPG-ESU-TU108A-005	Total/NA	Solid	Fill_Geo-21	489003
160-40338-6	HPPG-ESU-TU108A-006	Total/NA	Solid	Fill_Geo-21	489003
160-40338-7	HPPG-ESU-TU108A-007	Total/NA	Solid	Fill_Geo-21	489003
160-40338-8	HPPG-ESU-TU108A-008	Total/NA	Solid	Fill_Geo-21	489003
160-40338-9	HPPG-ESU-TU108A-009	Total/NA	Solid	Fill_Geo-21	489003
160-40338-10	HPPG-ESU-TU108A-010	Total/NA	Solid	Fill_Geo-21	489003
160-40338-11	HPPG-ESU-TU108A-011	Total/NA	Solid	Fill_Geo-21	489003
160-40338-12	HPPG-ESU-TU108A-012	Total/NA	Solid	Fill_Geo-21	489003
160-40338-13	HPPG-ESU-TU108A-013	Total/NA	Solid	Fill_Geo-21	489003
160-40338-14	HPPG-ESU-TU108A-014	Total/NA	Solid	Fill_Geo-21	489003
160-40338-15	HPPG-ESU-TU108A-015	Total/NA	Solid	Fill_Geo-21	489003
160-40338-16	HPPG-ESU-TU108A-016	Total/NA	Solid	Fill_Geo-21	489003
160-40338-17	HPPG-ESU-TU108A-017	Total/NA	Solid	Fill_Geo-21	489003

# QC Association Summary

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
 SDG: GJ46599776

## Rad (Continued)

### Prep Batch: 489475 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40338-18	HPPG-ESU-TU108A-018	Total/NA	Solid	Fill_Geo-21	489003
160-40338-19	HPPG-ESU-TU108A-019	Total/NA	Solid	Fill_Geo-21	489003
160-40338-20	HPPG-ESU-TU108A-020	Total/NA	Solid	Fill_Geo-21	489003
MB 160-489475/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489475/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40338-1 DU	HPPG-ESU-TU108A-001	Total/NA	Solid	Fill_Geo-21	489003

### Prep Batch: 489844

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40338-21	HPPG-ESU-TU108A-021	Total/NA	Solid	Fill_Geo-21	489003
160-40338-22	HPPG-ESU-TU108A-022	Total/NA	Solid	Fill_Geo-21	489003
160-40338-23	HPPG-ESU-TU108A-023	Total/NA	Solid	Fill_Geo-21	489003
160-40338-24	HPPG-ESU-TU108A-024	Total/NA	Solid	Fill_Geo-21	489003
160-40338-25	HPPG-ESU-TU108A-025	Total/NA	Solid	Fill_Geo-21	489016
160-40338-26	HPPG-F-031	Total/NA	Solid	Fill_Geo-21	489016
160-40338-27	HPPG-F-032	Total/NA	Solid	Fill_Geo-21	489016
MB 160-489844/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489844/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

### Prep Batch: 490555

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40338-1	HPPG-ESU-TU108A-001	Total/NA	Solid	DPS-7	489003
160-40338-11	HPPG-ESU-TU108A-011	Total/NA	Solid	DPS-7	489003
160-40338-21	HPPG-ESU-TU108A-021	Total/NA	Solid	DPS-7	489003
MB 160-490555/21-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-490555/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

### Prep Batch: 492111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40338-26	HPPG-F-031	Total/NA	Solid	DPS-7	489016
MB 160-492111/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-492111/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

# Tracer/Carrier Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40338-1  
SDG: GJ46599776

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

## Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40338-1	HPPG-ESU-TU108A-001	105	91.6
160-40338-11	HPPG-ESU-TU108A-011	103	92.7
160-40338-21	HPPG-ESU-TU108A-021	99.0	92.3
160-40338-26	HPPG-F-031	95.2	87.1
LCS 160-490555/1-A	Lab Control Sample	105	93.1
LCS 160-492111/1-A	Lab Control Sample	102	94.6
MB 160-490555/21-A	Method Blank	105	92.3
MB 160-492111/22-A	Method Blank	96.8	94.6

### Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier



Environment Testing  
America

## ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40339-1  
Laboratory Sample Delivery Group: D1189466  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 1

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

Authorized for release by:  
4/9/2021 4:27:54 PM

Rhonda Ridenhower, Client Service Manager  
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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40339-1  
SDG: D1189466

Job ID: 160-40339-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

## CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40339-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40339-1  
SDG: D1189466

## Job ID: 160-40339-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 11/11/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 10.4 C.

#### STRONTIUM-90 (GFPC)

Sample HPPG-ESU-TU108A-B-001 (160-40339-1) was analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/13/2020, prepared on 12/16/2020 and analyzed on 01/04/2021.

Strontium-90 prep batch 492111

The method blank (MB) z-score associated with Prep Batch 160-492111 is within limits and is stored in the level IV raw data. (MB 160-492111/22-A)

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU108A-B-001 (160-40339-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU108A-B-001 (160-40339-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 11/13/2020, prepared on 11/20/2020 and analyzed on 12/11/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 489844

The MB z-score for Th-234/U-238 associated with Prep Batch 160-489844 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489844/1-A)

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40339-1  
SDG: D1189466

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## Job ID: 160-40339-1 (Continued)

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### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Th-234: (MB 160-489844/1-A). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





# CHAIN OF CUSTODY

Ref. Document # 501197RSY-030

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Murri, Andrew

Sample Tech(s): Paul Leblanc

Project Number: 501197  
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
Project Location: San Francisco, CA  
Purchase Order #: 1159058  
Shipment/Pickup Date: 11/10/2020  
Waybill Number: 4452 6225 5954  
Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046  
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Analysis Requested					Dose Rate uR/Hr	Evidence Bag ID	Comment
					Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)						
SO	1			16 oz. plastic jar	X		X			S	D1189466	

**Special Instructions:** Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g  
21 day ingrowth results only

Turnaround Time: 3-day  10-Day  28-day  Other  Level of QC Required: I  II  III  Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew	<i>[Signature]</i>	11/09/2020 17:24	Locked Storage (RKillpack)	<i>[Signature]</i>	11/09/2020 17:24
Locked Storage (RKillpack)	<i>[Signature]</i>	11/10/2020 13:01	Andrew Murri	<i>[Signature]</i>	11/10/2020 13:01
Andrew Murri	<i>[Signature]</i>	11/10/2020 13:23	SHIPPED TO LAB via FedEx	Micha Kennington	11/11/2020 09:05

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*



160-40338 Chain of Custody

Page 6 of 16

4/9/2021 (Rev. 1)



# All Transfers for COC 501197RSY-030

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew	<i>Andrew Murri</i>	11/09/2020 17:24	Locked Storage (RKillpack)	<i>Michael King</i>	11/09/2020 17:24
Locked Storage (RKillpack)	<i>Michael King</i>	11/10/2020 13:01	Andrew Murri	<i>Andrew Murri</i>	11/10/2020 13:01
Andrew Murri	<i>Andrew Murri</i>	11/10/2020 13:23	SHIPPED TO LAB via FedEx	<i>Michael King</i>	11/11/2020 09:25



## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40339-1

SDG Number: D1189466

**Login Number: 40339****List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40339-1  
SDG: D1189466

## Qualifiers

### Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40339-1  
SDG: D1189466

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

**Protocol References:**

- DOE = U.S. Department of Energy
- EPA = US Environmental Protection Agency
- None = None

**Laboratory References:**

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Sample Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40339-1  
SDG: D1189466

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Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40339-1	HPPG-ESU-TU108A-B-001	Solid	11/09/20 15:45	11/11/20 09:05	

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# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40339-1  
 SDG: D1189466

**Client Sample ID: HPPG-ESU-TU108A-B-001**

**Lab Sample ID: 160-40339-1**

Date Collected: 11/09/20 15:45

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	0.0789	U	0.162	0.162	0.331	0.127	pCi/g	12/16/20 14:29	01/04/21 13:52	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	94.8		40 - 110					12/16/20 14:29	01/04/21 13:52	1
Y Carrier	86.7		40 - 110					12/16/20 14:29	01/04/21 13:52	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
<b>Actinium 228</b>	<b>0.656</b>		0.182	0.194		0.0273	pCi/g	11/20/20 14:56	12/11/20 10:38	1
Actinium-227	-0.284	U	0.623	0.624		0.377	pCi/g	11/20/20 14:56	12/11/20 10:38	1
Bismuth-212	0.000	U	0.569	0.569		0.639	pCi/g	11/20/20 14:56	12/11/20 10:38	1
<b>Bismuth-214</b>	<b>0.579</b>		0.130	0.143		0.0458	pCi/g	11/20/20 14:56	12/11/20 10:38	1
Cesium-137	0.0216	U	0.0407	0.0407	0.0700	0.0306	pCi/g	11/20/20 14:56	12/11/20 10:38	1
<b>Lead-210</b>	<b>1.18</b>		1.29	1.30		0.811	pCi/g	11/20/20 14:56	12/11/20 10:38	1
<b>Lead-212</b>	<b>0.404</b>		0.0996	0.112		0.0584	pCi/g	11/20/20 14:56	12/11/20 10:38	1
<b>Lead-214</b>	<b>0.529</b>		0.107	0.120		0.0577	pCi/g	11/20/20 14:56	12/11/20 10:38	1
<b>Potassium-40</b>	<b>10.1</b>		1.49	1.81		0.351	pCi/g	11/20/20 14:56	12/11/20 10:38	1
Protactinium-231	0.617	U	1.92	1.92		2.10	pCi/g	11/20/20 14:56	12/11/20 10:38	1
Protactinium-234	0.121	U	0.237	0.237		0.222	pCi/g	11/20/20 14:56	12/11/20 10:38	1
<b>Radium-226</b>	<b>0.579</b>		0.130	0.143	0.200	0.0458	pCi/g	11/20/20 14:56	12/11/20 10:38	1
<b>Radium-228</b>	<b>0.656</b>		0.182	0.194		0.0273	pCi/g	11/20/20 14:56	12/11/20 10:38	1
<b>Thallium-208</b>	<b>0.187</b>		0.0635	0.0664		0.0245	pCi/g	11/20/20 14:56	12/11/20 10:38	1
<b>Thorium 228</b>	<b>0.404</b>		0.0996	0.112		0.0584	pCi/g	11/20/20 14:56	12/11/20 10:38	1
<b>Thorium-232</b>	<b>0.656</b>		0.182	0.194		0.0273	pCi/g	11/20/20 14:56	12/11/20 10:38	1
Thorium-234	0.435	U	0.565	0.567		0.459	pCi/g	11/20/20 14:56	12/11/20 10:38	1
Uranium-235	0.0714	U	0.107	0.107		0.445	pCi/g	11/20/20 14:56	12/11/20 10:38	1
Uranium-238	0.435	U	0.565	0.567		0.459	pCi/g	11/20/20 14:56	12/11/20 10:38	1

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40339-1  
 SDG: D1189466

## Method: 905 - Strontium-90 (GFPC)

**Lab Sample ID: MB 160-492111/22-A**  
**Matrix: Solid**  
**Analysis Batch: 493835**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 492111**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.03798	U	0.125	0.125	0.331	0.106	pCi/g	12/16/20 14:29	01/04/21 13:58	1
<b>Carrier</b>	<b>MB MB</b>		<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
	<b>%Yield</b>	<b>Qualifier</b>								
Sr Carrier	96.8		40 - 110					12/16/20 14:29	01/04/21 13:58	1
Y Carrier	94.6		40 - 110					12/16/20 14:29	01/04/21 13:58	1

**Lab Sample ID: LCS 160-492111/1-A**  
**Matrix: Solid**  
**Analysis Batch: 493723**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 492111**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Strontium-90	7.75	6.756		0.712	0.331	0.115	pCi/g	87	75 - 125
<b>Carrier</b>	<b>LCS LCS</b>		<b>Limits</b>						
	<b>%Yield</b>	<b>Qualifier</b>							
Sr Carrier	102		40 - 110						
Y Carrier	94.6		40 - 110						

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID: MB 160-489844/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491443**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 489844**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Actinium-227	0.06310	U	0.159	0.159		0.330	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-212	0.0000	U	0.133	0.133		0.335	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-214	-0.008210	U	0.114	0.114		0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Cesium-137	0.007259	U	0.0689	0.0689	0.0700	0.0558	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-210	1.261		1.60	1.61		1.05	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-212	0.01003	U	0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-214	0.03327	U	0.0785	0.0786		0.0761	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Potassium-40	-0.5926	U	0.723	0.726		0.723	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-231	0.3075	U	0.995	0.995		0.778	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-234	0.03644	U	0.0817	0.0817		0.166	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-226	-0.008210	U	0.114	0.114	0.200	0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-228	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thallium-208	0.04141		0.0370	0.0373		0.0238	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium 228	0.01003	U	0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-232	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-234	-1.112	U	0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-235	-0.04770	U	0.334	0.334		0.304	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-238	-1.112	U	0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40339-1  
 SDG: D1189466

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

**Lab Sample ID: LCS 160-489844/2-A**  
**Matrix: Solid**  
**Analysis Batch: 491441**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 489844**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec.
									Limits
Americium-241	96.4	97.37		10.2		0.588	pCi/g	101	87 - 116
Cesium-137	26.7	26.30		2.84	0.0700	0.0907	pCi/g	98	87 - 120
Cobalt-60	9.47	9.183		0.997		0.0186	pCi/g	97	87 - 115

# QC Association Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40339-1  
SDG: D1189466

## Rad

### Leach Batch: 489016

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40339-1	HPPG-ESU-TU108A-B-001	Total/NA	Solid	Dry and Grind	

### Prep Batch: 489844

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40339-1	HPPG-ESU-TU108A-B-001	Total/NA	Solid	Fill_Geo-21	489016
MB 160-489844/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489844/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

### Prep Batch: 492111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40339-1	HPPG-ESU-TU108A-B-001	Total/NA	Solid	DPS-7	489016
MB 160-492111/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-492111/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

# Tracer/Carrier Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40339-1  
SDG: D1189466

**Method: 905 - Strontium-90 (GFPC)**

**Matrix: Solid**

**Prep Type: Total/NA**

### Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40339-1	HPPG-ESU-TU108A-B-001	94.8	86.7
LCS 160-492111/1-A	Lab Control Sample	102	94.6
MB 160-492111/22-A	Method Blank	96.8	94.6

#### Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier